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EDITORIAL — SOME HIGH LIGHTS

General Economic Scene :

State :

Planning Commission : At the end of February, the Chief Minister as Chairman, met the Planning Commission to review the work todate and some decisions were arrived at to orient its future work. First the work of the Commission on the 12 year (1972-84) Perspective Plan frame was reviewed. The objectives of the Plan for this period were defined as :

(i) Increasing the per capita real income;

(ii) Providing full employment;

(iii) Attacking in a selective manner the worst forms of poverty;

(iv) Bringing about social justice by reducing economic and social inequalities;

(v) Accelerating the process of social change necessary for economic growth by transforming the social structures and social attitudes;

(vi) Promoting cultural activities and community participation in culture as a means of humanising economic development programmes; and

(vii) Decentralising planning, development and resource mobilisation.

In light of these objectives the strategy, the targets as to investment outlay in both the public and private sectors, savings, capital-output ratio and resources mobilisation and the broad outlines of the sectoral programme will be elaborated by the Commission and the Tamil Nadu Perspective Plan Frame presented to the Chief Minister on 1st May, 1972. Second a Techno-Economic Study of the Ramanathapuram district is now to be undertaken by the Institute for Techno-Economic Studies, Madras and completed within nine months. A similar study of the Dharmapuri district has been approved and will be started when the funds are released by the Ministry of Finance. The Commission will also undertake an industrial growth study of the Manali-Kalpakkam complex. Third the work of the fifteen task forces and their working groups dealing with fifteen sectors of the Perspective Plan was noted with satisfaction. The statistical base for the 14 district Plans being prepared by the 14 district Collectors will be established by March 15, by the district statistical officers on the basis of the detailed inventories questionnaire prepared and sent to them by the Planning Commission. Each district dossier of inventories will comprise information on man-power supply and demand, employment potential, land, water and mineral resources, power-supply and distribution, drinking-water facilities, fisheries and livestock resources, agriculture, marketing, storage and processing facilities, co-operative institutions, banking, savings and credit facilities, educational, medical and health facilities, industries, communications system and financial resources including rural credit. The Chief Minister has approved the names of 14 district planning officers who have now been posted to the districts and who are to be trained by Commission during the

fortnight April 17-29. They will help the Collectors draft the district Plans which should reach the Commission by 1st July. Each district Plan will identify the main economic activities to be developed, list the subsidiary and supplemental activities in their order of importance, determine their infrastructural needs in terms of inputs and services, indicate the basic requirements of backward areas and backward classes, corelate the requirements of various areas, and determine the content, cost and location of each project. In drafting its Plan, each district will assume the availability of the resources from the State and Panchayat Union at a rate rising from 6 to 10 percent in relation to resources available to it during the Fourth Plan. Fourth the Chairman examined the Commission's proposal to set up under its aegis the Tamil Nadu Development Research Council. (See also Vol. I Nos. 10 & 11 of the Bulletin). The Council will (a) promote studies and research needed for the execution of the remaining period of Fourth Plan and for the formulation and, at the appropriate stage execution of the Fifth and Sixth Plans, (b) advise and assist the State Planning Commission in its task of preparing the Perspective Plan, (c) bring together business leaders, Government Secretaries, Research Specialists, etc. in the State to promote and intensify the needed development oriented research. This is in line with the current thinking at the national level where the National Committee for Science and Technology has already been established and the desirability of establishing State branches to work in close co-operation with the National Committee has also been expressed. In this connection, it is of interest to note that the Maharashtra Government has already established such an organisation. The membership of the Council will be approved by the Government on the recommendation of the Commission. The Chairman decided to further review the proposal with the Deputy Chairman and make the decision on the setting up of the Council.

1972-73 Budget: The State budget for 1972-73 presented to the legislature is based on estimates of revenue of Rs. 397.27 crores and expenditure of Rs. 394.78 crores, including Plan expenditures of Rs. 116.63 crores. For 1971-72 the anticipated deficit of Rs. 15.84 crores is turning into a surplus of Rs. 1.74 crores due to increased taxes, the buoyancy in excise revenues and a large loan from the Centre. The 1971-72 Plan expenditure authorised by the Central Planning Commission was Rs. 80.20 crores but the actual outlay will have been Rs. 114.98 crores the deficit being avoided by the Central loan of Rs. 66.33 crores which covered the relevant overdraft. The 1972-73 budget provides for (a) repayment of 3 percent of the Central loan (Rs. 1.95 crores with Re. 1.99 crores being repaid in the 1971-72 accounts); (b) additional revenues through 10 percent surcharge on motor vehicles (Rs. 1.50 crores), 5 percent increase in betting tax (Rs. 50 lakhs), and an increase in panchayat union local tax surcharge from Re. 1.50 per rupee of land revenue to Rs. 2.50; (c) in the way of new expenditures, increased farm credit (Rs. 61 crores for medium and short term loans); ten new veterinary dispensaries; dairy development in Madras (Rs. 55 lakhs plus Rs 8.87 crores to raise milk distribution to 3 lakhs litres per day); irrigation scheme (Rs. 8.17 crores) including modernisation of the Cauvery delta irrigation system and the linking of the Southern rivers, Cauvery, Godavari and Krishna as a first phase of a national water grid; power schemes including Tuticorin thermal; Kalpakkam atomic and Pandiar-Punhapuzha, the Pemban and Sethusamudram projects; drinking water and roads in small villages and hamlets; health programme comprising improving Madurai, Coimbatore and Tirunelveli Medical Colleges, building 32 bed hospitals at Kumbakonam, Athoor, Tirupathur and Tenkasi, increasing Government hospital bed strengths at Tanipadi, Tittagudi, Vallipuram, Karaikudi and Mettur and take

over of 45 Panchayat Union dispensaries; increased administrative expenditures including machinery to examine grievances of teachers and staff; the costs of the civil supplies corporation and the proposed Tamil Nadu Trading Corporation to hold the price line; expanded programmes of beggar rehabilitation; abolition of land ceiling exemption and lowering the family ceiling from 60 to 40 standard acres, and debt relief for tenants, labourers and wage-earners.

The budget presented is a sound fiscal and programme instrument. It is a balanced budget showing a small surplus, its main thrust is on agriculture (irrigation, credit, land ceiling) and its attack on State poverty includes health, drinking water, debt relief for the poor, beggar rehabilitation and keeping prices down for the poor consumers. There is also an interesting international innovation in the reverse brain drain proposed through the 50 Tamil Nadu Scholarships to bring back for 6-12 months Tamilian specialists living in the United States and Europe to work on the State education and development programmes. On the other hand the limitations of the proposed budget are equally striking. There are no new major development projects proposed. The major part of the Plan outlay of Rs. 117 crores is on irrigation and power, with heavy emphasis on modernisation and consolidation of existing facilities, rather than creation of new programmes. There are projects awaiting action, such as the Second Atomic Power Station in the southern part of the State, the Sethusamudram canal project, a whole list of ancillaries around the industrial complexes of the State and a further selective attack on poverty. The constraint is finance and there is a clear case for financial devolution from the Centre to the State and a fairer and more requitable sharing of State and national financial resources, if the State is to discharge its development obligations to the people—particularly to the poor majority. In the present financial context, the budget presents not even a minimal annual Plan (the Fourth Plan will end with Rs. 575 crores instead of Rs. 710 crores) and even this subminimal Plan depends for 40 percent of its finance on an overdraft which has had to be converted into a loan from the Centre to the State. The result is that the budget receives a loan of Rs. 45.80 crores and provides for a repayment of Rs. 53.38 crores, the entire capital developmental expenditure having to be financed from the limited State resources. The State's budget plea to the Centre for softening the terms of the loan in terms of the period of repayment and interest rate may thus seem a practical and immediate palliative.

But the palliative really postpones a serious problem. The problem is extremely serious. In 1951 the public debt of all the States was Rs. 345 crores (Rs. 58 crores being their market borrowing, land compensation bonds etc. and Rs. 155 crores being the loans from the Centre). Today in 1972, it is Rs. 8,758 crores (Rs. 1,298 crores of the first category and Rs. 6,510 crores being loans from the Centre.) The States' indebtedness to the Centre has thus increased by 195 percent per annum. Their loan repayment to the Centre has resulted in diminishing the net Central aid from 68 percent to 23 percent. In fact, as the Tamil Nadu situation shows, today the Centre has loaned Rs. 966 crores to the States and will receive in repayment Rs. 977 crores. In this situation the postponement of the repayment obligations or softening the terms of lending will simply mean that the future will have to carry this heavy load. It is true that the Centre also faces a deficit financial situation this year and next year because of the Bangla Desh refugees, the war and the Bangla Desh rehabilitation factors. From this point of view the plea for softening the loan terms for this year and next year seems reasonable. But the overdraft position is worrying. At November 1971, eight States had a total overdraft of Rs. 254 crores,

Tamil Nadu registering the highest absolute amount of Rs. 59 crores. There are States, which unlike Tamil Nadu, are not making the effort to raise maximum internal resources. There are other States like Mysore which are running overdrafts by operating unapproved projects. On unauthorised irrigation schemes on the Cauvery, it is spending Rs. 38 crores, its overdraft standing Rs. 40 crores. But from this it is not possible to conclude that the overdraft problem is a spendthrift problem or one of States' living beyond their resources – what are the State's resources? What are Centre's resources? A long run solution of State indebtedness must rest on the Centre decreasing its non plan and administrative expenditures, converting a part of the loan into grants, funding the State's remaining in debt and above all on a rational sharing of all revenues, including full mobilisation of rural and agricultural taxes which have been hitherto untapped. What is needed is a global examination of all resources, revenue and capital, of the country, and a sharing of the resources between the States and Centre on the basis of their respective functions. The technical Committee set up by the Planning Commission and Ministry of Finance on this problem can undertake preliminary technical preparation of this issue which should be reviewed at a wider forum of economists and business leaders whose recommendations could form the basis for a decision by the National Development Council.

Development in the State and the Country demands a thorough going revision of Centre-State financial relations—both in the sharing of tax revenue and in the allocation of capital resources from the financial institutions. In this regard the work of the Finance Commission and the recently established Raj Committee on taxation of agricultural income and wealth should supplement each other and lay the basis for basic revision of the principles and practice of Centre-State sharing of the nation's financial resources. The Raj Committee will be concerned essentially with suggesting ways of maximising resource mobilisation both through direct taxation of agricultural wealth, income and capital gains and the consequential changes in the system of taxation of wealth and income in general. This will be the first Central initiative at resource mobilisation entirely accruing to the State and together with the recommendations of the Finance Commissions and the Rajamannar Committee could provide the frame for the State's embarking on development plans and programmes that can make a real dent on the poverty of the people.

Tourism: The tourist industry in the State is undeveloped. There is a great potential with its exceptionally wide 1000 km. beach and seashore, its historic temples and its scenic regions such as the Krishnagiri reservoir, the Thalli lake region, Kovalam and Kanyakumari. Of the 4,00,000 persons who pass through or visit the Country, a very small percentage, less than 10 percent, visit Tamil Nadu and South generally. It is no longer distances that account for this lack. Bali, Singapore and Cambodia are even further away from the countries of origin of the average tourist. With the round the world fare of $ 450, Tamil Nadu is within the geographical and financial reach of all tourists. What is needed to promote the industry in the State is to work out the details of the campaign, "Come to the South" recently launched by the Minister of Tourism. It means an intelligent and well planned educational publicity campaign in the Americas, Europe and Asia concerning Tamil Nadu, a programme of speeding up the building of hotels and motels similar to those being constructed at Krishnagiri, Madurai and Villupuram and servicing the main tourist centres in the State and the South with capacity tourist aircraft. In this connection as a major tourist attraction, the Government should

continue with the renovation of the temples of Tamil Nadu with the help of Unesco, which also brings out an attractive brochure in English and French of every temple in whose renovation it has taken a part. This adds to the tourist literature on the State which is urgently needed in the other countries.

National :

The National Budget: The National budget for 1972-73 presented to the Lokh Sabha is based on the Revised 1971-72 estimate of Rs. 6,668 crores as income and Rs. 7,053 crores as expenditure, with a deficit of Rs. 385 crores. The Budget for 1972-73 is estimated at Rs. 4,343 crores on revenue and Rs. 2,095 crores on capital account as income and Rs. 4,124 crores on revenue and Rs. 2,689 crores on capital account as estimated expenditures, involving a deficit of Rs. 375 crores. Additional tax proposals on kerosene, steel, aluminium, fertilisers, power driven pumps, cigarettes, tobacco, rayon and synthetic fibres and yarns, foam rubber and tyres, lotteries and co-operative dividends, business incomes and customs will bring in Rs. 133 crores, making the net deficit Rs. 240 crores. The Budget proposes a 25 percent increased Central Plan outlay of Rs. 1,787 crores (the 1971-72 outlay was Rs. 1,455 crores) and a 12 percent increase in States Plan outlay of Rs. 1,666 crores (in 1971-72 the States Plan was Rs. 1,440 crores). Rs. 130 crores is provided for special loans to cover non-plan gaps of States. Among the programmes proposed and/or continued are a lump sum of Rs. 125 crores provision for rural water supply, housing and slum clearance, primary education and educated unemployment programme, nutrition of the pre-school child (Rs. 21.5 crores, being a 100 percent increase), rural works, small farming and employment programme (Rs. 72 crores). Defence expenditures are held to Rs. 1,400 crores (the estimated 1971-72 level) Rs. 100 crores provided for food subsidy and Rs. 25 crores provided for food stocks.

The national budget is on the whole a sound holding operation as between the problems of the past year and the coming year, and represents a fiscal policy which responds, in so far as budget policy can and should, to the two imperatives facing us, the refugees, the wars, the rehabilitation of Bangla Desh and the flood ravages of the past year and the urgency to break out of our economic stagnation and achieve a 6-7 percent growth rate and share our resources with Bangla Desh during the current year. The Budget through keeping deficit financing to a relatively modest Rs. 240 crores in addition to holding last year's deficit to a moderate Rs. 380 crores as against the Rs. 400 crores forecast in the last issue of the Bulletin) and not increasing further or sizably income and corporate taxation, provides the necessary fiscal frame for going ahead with our immediate objectives. Generating growth to at least double that of 1971-72 is made possible by the 22 percent increase in public investment (Rs. 710 crores) with its multiplier effect on private investment, the absence of disincentives to increased investment and business generally resulting from the tax holiday on personal and corporate incomes. Here the lacunae caused by not replacing the abolished development rebate scheme should be quickly filled. But budget policy is necessary but not sufficient condition for growth generation. Whether in fact the spurt in growth will be realised will depend primarily on the managerial resources and performance in our public enterprises leading to capacity production and generation of savings. (In this regard see the rather exceptional achievements of the BHE in Trichy analysed in Vol. II Nos. 1 and this issue of the Bulletin). Apart from our current managerial bottleneck, growth generation will also depend on price behaviour—particularly that of industrial raw materials on which the budget can have adverse

effect unless watched and controlled. A second agreed objective met by the budget is the provision of Rs. 118 crores (net) for Bangla Desh Development. This is an inadequate provision and may have to be increased. (See Vol. II Nos. 1 and 2 of the Bulletin). Third the defence needs, which continue to have national priority including replacement of war damaged equipment, are held to the same level as the revised 1971-72 estimate. Fourth in the area of concerted attack on poverty, there are more minuses than pluses. The continuation and in some cases strengthening of the anti-poverty programmes of nutrition, unemployment action, rural housing, slum clearance and water supply, aid to dry, small and marginal farming, primary education and literacy together with restriction on consumption of aluminium, steel (where the import bill of Rs. 200 crores cannot be allowed to continue) cement and their results on high cost housing, refrigerators, transistors, and utensils generally—all these are a plus. But the minuses include the kerosine tax, the tax on fertilisers and pump sets which will hit the small and medium farmer relatively more than the larger farmer, the failure to touch the parallel economy represented by black money and the growing rural and urban incomes that it generates as well as the continued exemption of the rising agricultural incomes of the large farmers. This part of the fiscal frame must be renovated and remedied during the current year in light of the Wanchoo and Raj Committees recommendations. The most serious negative element in the budget from the point of view of growth and an effective attack against mass poverty is that there is no financial devolution on the States, to generate in them the will and place on them the financial responsibility for the *Garibi Hata* commitment, where the responsibility lies and the will must be generated. Fiscal policy represented in the budget continues and strengthens the centralisation of revenues and of the originating and approving authority of all developmental programmes and the grant of Central assistance and doles to the States. A further step could have been taken by the budget in financial devolution on the States beyond the Rs. 25 crores which it now proposes to devolve on them, in accordance with the recommendation of the Fifth Finance Commission. While all the activities under the anti-poverty programme are the States' responsibility, the lump sum central financial provision of Rs. 125 crores is retrograde in terms of not equating functions and finance. Finally the budget reflects to a marginal extent the national policy decision of self-reliance—marginal, because execution of this policy depends on extra budgetary factors. Net aid in 1972-73 is assumed to be of the order of Rs. 360 crores, which is marginally less (Rs. 25 crores) than the 1971-72 aid. This may be unrealistic. The budget does not prevent a surge in exports—both traditional and non-traditional—except in the matter of the cost structure that will follow. The savings expansion that self-reliance calls for can be aided by further public borrowing—Central and State—than that indicated in the budget. There is here a reserve resource that can be called to play when the import-export trends are known, and the investment needs more fully assessed.

Growth—Current and Perspective: The growth rate for the year 1971-72, the first year of the Second Development Decade is likely to be 4.7 percent, (the NCAER forecastes is 3 percent) against the Plan target of 5 percent and Second Decade target of 6 percent. As reported in the last issue, industrial growth is almost nil—at 1.9 percent. The 1970-71 growth stands at 4.7 percent, well below the average of 5 percent for all Developing Countries, the main reason being a 3.5 percent growth in industry. The National Council of Applied Economic Research proposes a doubling of the growth rate for 1972-73 to 7 percent—from its computation that the current year's rate will be not 4.7 percent but around 3 percent. There are several good reasons for this 7 percent growth perspective.

Agriculture is performing at high rates, to the point where storage rather than supply, selective exports rather than worry over stoppage of PL 480 is now current. Foreign exchange reserves stand at a comfortable $1,000 million. Thus a carefully planned programme of imports of equipment, components and materials, including capital goods can spark industrial recovery to the growth point of 9 to 10 percent. This import programme can only be partly financed by drawing down on our reserves as the increase in exports is around 3 to 4 percent in place of the 7 percent target and the trade gap is likely to continue at around $300 millions (Rs. 225 crores). Hence the import programme should be financed by fuller capacity production of steel and fertilisers and stepping up the production of cotton, pulses and oil seeds. A further reason for siting the growth rate at 7 percent despite the poor industrial performance 1971-72 is that the contribution of industry to the Gross National Product is around 20 percent and within that share, that of the organised sector is a mere 8 percent. Hence the impact of the slow down in industry on national income in terms of growth is not the major issue. A further reason for suggesting the 7 percent growth rate is the country's responsibility for aiding the rehabilitation of Bangla Desh. By early March all the 10 million refugees had returned home. The Bangla Desh government carries a heavy load for relief and development. Something like 2 percent of the proposed growth rate for 1971-72 must be used to transfer to Bangla Desh real resources—rice, drugs, sugar, kerosene, cloth, machinery and intermediate to help in its development effort.

Price, Credit and Resource Mobilisation : The major issue is the pressure which the growing agricultural incomes are beginning to exert on consumer and intermediate goods. Further in some areas such as in paper and cement, capacity constraints have developed. In examining the resulting imbalances, the money supply position needs analysis. An 11 percent increase (Rs. 798 crores) in money supply was registered in 1971. At the start of February, there has been a small contraction of currency, by Rs. 25 crores. Despite the decline in industrial growth and the rapid growth in money supply and contrary to the indications during the first nine months in 1971 reported in Vol. I Nos. 9 and 10 of the Bulletin, the 1971 price rise has been a modest 2.7 percent—a normal trend in any developing economy. It has been the lowest rise recently—in 1970 the rise was 6.5 percent, and in 1969, 2.9 percent. In the first nine months of 1971, January-September, the rise was 6.3 percent but the last three months registered a decline of 3.4 percent. The curious coexistence of decreasing supply of manufactured goods, increased money supply and modest price rise during 1971, belying both the Banking and currency sources of thought can be traced to two major causes. First the supply side. On the side of agricultural prices, as reported in Vol. I No. 8, the price of rice was high (13.7 and 4.3 in the two periods) as was that of wheat (at 2.2 percent), while fibres and oil seeds registered marked price declines (from 12 to 5 percent). The manufacturing prices on the other hand rose steeply by 7 percent. Thus the strong pressure on manufacturing prices has been dampened by abundant agricultural supplies and their greater weightage in any system of computation of the national economy as referred to earlier and as the table on the next page indicates.

The other factor is that in 1971 deposits rose rapidly by over 20 percent, to Rs 1,200 crores due to the work of the branches net work of the scheduled banks, particularly in the South. On the other hand advances to trade, industry and agriculture including the priority sectors, increased only by 11.5 percent to Rs. 515 crores. This is in contrast to

Wholesale Price Index (1961-62—100)	Percentage change In Sept. 71 over Dec. 70	In Dec. 71 over Sept. 71	In Dec. 71 over Dec. 70
1. Food Articles	+ 8.9	— 6.1	+ 2.2
(a) Rice	+ 13.7	— 8.3	+ 4.3
(b) Wheat	— 0.2	+ 2.3	+ 2.2
2. Liquor & Tobacco	+ 4.9	+ 2.3	+ 7.3
3. Fuel, Power & Lubricant	+ 6.6	+ 0.6	+ 7.3
4. Industrial Raw Material	— 1.1	— 7.9	— 8.9
(a) Raw Cotton	+ 5.5	— 17.0	— 12.3
(b) Raw Jute	— 10.7	— 2.2	— 12.7
(c) Groundnuts	+ 5.7	— 10.2	— 5.1
5. Chemicals	+ 5.3	+ 1.7	+ 7.1
6. Machinery & Transport equipment	+ 6.2	+ 1.9	+ 8.3
7. Manufactures	+ 5.9	+ 0.7	+ 6.7
(a) Intermediate Products	+ 9.3	— 1.2	+ 8.0
(b) Finished Products	+ 4.9	+ 1.3	+ 6.8
(c) Commodities	+ 6.3	— 3.4	+ 2.7

1970 when deposits increased by Rs. 810 crores (16.6 percent) and advances by Rs. 835 crores (23 percent). While the comfortable resource position of the banks including that of no large scale borrowing from the Reserve Bank is to be welcomed, this increased deposit mobilisation is due more to the spread of banking habits and activities, rather than to increased production and incomes. The policy of credit restraints has not made available the needed resources to the production and distribution sectors. Certainly there has been no real expansion of farm credit for the neglected and priority section of farmers. The kind of isolated experiences reported from one State of nationalised banks having advanced large crop loans in 1969 and 1970 which they are now unable to collect is no explanation. No bank had any excuse, for example to make groundnut loans when it was not the season or when the area grew only rice or to make dairy or fertiliser loans which were put to other uses. The small farmer and the small industrialist are still in the credit waiting line. There has been on the other hand the trend of increasing credit to the Government as noted in Vol. I No. 10 of the Bulletin. Advance to Government, Central and States, stand at a record of Rs. 1,132 crores at 31st December, 1971. There may be a pick up in demand for advances to business with current efforts to increase industrial production and the larger supply position of cash crops.

The problem is, however, much deeper and is concerned with the savings—investment equation of the last two years of the Fourth Plan. The increased deposit mobilisation moves us somewhat nearer the seemingly unattainable Plan target for savings as far as private and households savings are concerned. There is need for reduction in our various forms of wasteful and conspicuous consumption. There is even more urgent need for the public sector enterprises contributing to this task by getting as close as possible to the target of Rs. 620 crores assumed for the last two years of the Plan period. But what is disturbing is the savings - investment gap which the 1971 record reveals. Instead of

investments increasing as planned by 33 1/3 over the Plan period, they have been stationary. There is need for stepping up investment in the public and private sector much more than what is now envisaged for the fourth year of the Plan. The first year expenditure was Rs. 2,200 crores, the second Rs. 2,800 crores—a rise of 27 percent. For the third year, it was planned at Rs. 3,158 crores (a 7 percent rise), while the actual is likely to be Rs. 3,000 crores. For 1972-73 the Plan envisages a total of Rs. 3,540—Rs. 1,875 crores in the Central sector and Rs. 1,575 in the State sector. If the States raise Rs. 100 crores, the four years spending will be Rs. 11,450 crores, leaving an expenditure target of Rs. 4,550 crores for the last year. This will involve an increase in investment of 32 percent over the fourth year. The moral for 1972-73 is that there should be no alibis with regard to resource constraint in light of the resource balance with which we are closing the year 1971-72 In the Central and States sector there should be sustained effort to surpass the Plan targets of investment.

Trade and aid : The aid picture for the year 1971-72 is now becoming clear. Total aid for the nine months April-December 1971 amounts to $754.77 million (Rs. 566 crores) compared to the 1970-71 twelve month total of $ 966.5 million (Rs. 724.9 crores). The project aid for 1971-72 is higher at $437.30 million (Rs. 327 crores) compared to $ 309.3 million for 1970-71. It is non-project aid which has declined 50 percent from $657.2 million in 1970-71 to $317.47 million, including $85.84 million for debt relief. The non-project aid reduction is due to the United States cutting back such assistance from $200 million in 1970-71 to $43.73 million in 1971-72 (See Vol. II Nos. 1 & 2) The immediate effect is contraction in United States-India trade. The Government has suspended letters of credit for United States imports and credit facilities from United States suppliers. It is planning to displace avoidable imports from hard currency countries by substituting orders from within or the rupee trading area. A number of projects in Tamil Nadu are affected by this freeze, including the Manali carbon black project, which holds import licences under United States non-project funds, and for which alternate sources have to be developed. More generally the cut in United States non-project aid will slow down private American investments in India which used their Government aid as a lubricant and insurance against devaluation and nationalisation. The process of import substitution is also receiving a further fillip in the country and the process of Indianisation of foreign firms which are planning expansion programmes is being speeded up to prevent increased repatriation of funds from the country by way of dividends. All this should be seen in the frame of the kind of import policy needed to step up industrial growth which has been referred to earlier, and the change in production priorities suggested in the last issue of the Bulletin (Vol. II No. 3)

The other phase of the response to the aid cut and the policy decision of economic self reliance is export promotion. Here the picture is not encouraging. First there is a strange sort of chaos on the facts. One part of the Government, the Ministry of Foreign Trade, claims that the 1970-71 export growth was 8 percent (quoted in Vol. I No. 5 of the Bulletin) and that the 1971-72 export growth is likely to be 5 percent. Another part of the Government, Ministry of Finance claims that the statistics should be 0 and 3 percent for the two years. The Reserve Bank claims that the figures are 4.5 and 5 percent respectively. This rather phantasmogoric situation arises from changes made in the middle of the two year period in the computation methodology and should be quickly and easily resolved. The reality is perhaps nearer the NCAER computation of 3-4 percent for

1971-72 and a projected 5 percent for 1972-73, if all other assumptions come true. A second problem is the trade relations between the country and the enlarged Common Market of 10 industrialised countries controlling 40 percent of the international trade. The hope expressed in Vol. II No. 2 of the Bulletin that with United Kingdom joining the Common Market, India's trade will receive a boost still remains a hope. There is the general problem that the Generalised Scheme of Preferences (GSP) of the Common Market being restricted to a few commodities which are of marginal interest to the country such as transmission, conveyor elevator belts, felt rubberised textile fabrics, clocks and watch glasses. Our traditional export items like jute, tea, textiles, tobacco face a low ceiling for their entry and sale in the Common Market. In respect of our engineering goods, the Common Market imports are a small $4.4 million. The rupee trade with the Soviet Union and the Eastern European countries is expanding. It is necessary to press ahead with a comprehensive trade agreement with the enlarged Common Market and build up close and growing trade relations through trade missions and representatives in these countries. More generally there is need for an export promotion drive with regard to engineering goods exports. Engineering exports will amount to Rs. 135 crores in 1971-72, being Rs. 40 crores short of the target. The decline in exports due to steel shortage and the shipping bottleneck can now be corrected through capacity steel production, selective steel imports and a revision of the export tariff. A further initiative to boost exports is the Ministry of Industrial Development's proposal to the Indio-British Technological Group to help develop 100 percent export oriented industries in the country, in return for relaxing some of the existing restrictions on foreign capital and allowing the import of the machinery which is competitive with Indian production. Under this scheme British and other foreign plants can be shifted entirely in India to take advantage of the cheaper goods and services in this country and to enable those countries to concentrate on production of more sophisticated goods. Under this more rational division of labour and specialised productions between India and other countries, completely export oriented industries can be started by either expanding existing units in this country or through joint ventures in third countries. As this proposal is acted on, there will be a sizable improvement in the country's export performance. So far firm agreement has been reached for shifting complete plants of 3 United Kingdom and 1 Dutch Company to India. There are six further proposals for shifting two new export oriented companies to India and for four firms to import capital equipment for export production All these 10 projects will relieve capacity constraints and generate export surpluses. There are 19 more projects under study. These projects in toto will involve a foreign exchange import bill Rs.2 crores and a foreign exchange export earning of Rs. 10 crores. There is need to ensure that those projects represent net foreign exchange earning and are of a short term nature, which does not run counter to the Indianisation policy. There are other important programmes that can expand our trade as part of the policy of self reliance. One such programme is a system of dual exchange rates which will act as an incentive to export oriented industries to step up their production and sales on return for larger domestic currency resources that their export will earn.

International :

World Trade : The start of the Second Development Decade does not confirm the hopes and promises of the Decade or expanding the share of developing countries in World trade. The Indian trade dilemma outlined above also applies to the developing

world. During the first six months of 1971 their share of the total world trade of $ 278,600 million declined to 19 percent, while that of the developed countries rose to 81 percent. The export growth of the developing countries was 10.7 percent, while that of the developed countries was 15.6 percent. Among the developing countries, Latin America registered relatively the highest exports growth of 11.7 percent in 1970 and 14.5 percent in 1971 (six months). Asia's share of world exports decreased from 10.5 percent in 1960 to 6 percent in 1970 and export growth from 10.6 in 1970 to 7.9 percent in 1971. On the other hand, the growth rate of its imports rose from 12.6 in 1969 to 22.3 in 1970. Thus a start has yet to be made by the rich countries in redeeming their Second Decade trade pledges to the Developing world.

Aid: The Common Market Commission has made recommendations in early February for giving effect to the Second Decade's aid strategy. It has proposed that all its members spend one percent of their GNP as aid by 1975. The major part of this aid should be intergovernmental and not private commercial loans at present. In addition the proposal is to provide aid in the form of grants and not loans—hard and soft—and above all to loosen the currently tied aid. Under the proposal the grant can be spent in any of the Common Market countries. When membership expands to ten countries, this would represent a considerable qualitative improvement in aid.

Water: 49 percent of city people in the world have piped water supply or sewage, according to a World Health Organisation Survey. At present 26 percent of these people are served by stand pipes. If this group is to be increased to 60 percent by the end of the Second Decade some $9,000 million of investments in water systems must be made. This is a small sum in relation to the annual arms expenditures of over $200,000 referred to in the last issue of the Bulletin (Vol. II No. 3). But with present priorities, the sum will not be forthcoming in the Second Decade according to the World Bank. The real constraints, however, that water and sewage projects face all over the developing world are those faced by the State Planning Commission and its Task Force on water supply and sanitation which I head. The first problem is that the projects require a long lead time but are usually planned in response to immediate pressures, such as the population explosion and water wastage in cities, (urban population is increasing at a rate of 6 percent and piped water is lost at the rate of 25 percent per annum). One person active in this field reports to the Task Force that public taps which are a political must, are the major source of waste—hydrological and financial. He himself campaigned for 200 such taps during his election and now finds them the obstacle to sound and economic water supply. A second problem is that public utility management is a recent and new technology and is only now being learnt and mastered. Finally the sound business basis of all water and sewage schemes is lost sight of under the various pressures that the developing country faces as just noted. The consumer can and must pay the cost of the services rendered as he does for power and fuel. It is only on this basis that adequate feasibility and engineering studies can be prepared. If that were done, finance will be no constraint, as seen in the Perspective Planning in this State.

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Agricultural Developments :

Food Output and Future Perspectives: The agricultural growth of the State for year 1971-72, is 8.9 percent and in food production it now ranks first replacing Maha-

rashtra. Among the causes for this performance are the use of high yielding variety, fertilisers. soil testing, adaptive research, credit and water use and management. In the year 1971-72, 41 lakh acres have been under High Yielding Varieties. It is proposed to increase this High Yielding Variety area by over 50 percent to 66 lakh acres in 1972-74. To the 112 million tonnes food grain production and the increase in rise production by over 1½ million tonnes during 1971-72, Tamil Nadu food and rice production has made a major contribution to compensate for the poor performance of Andhra Pradesh and the drought in parts of Mysore. In addition, the large scale rice production of Punjab, Haryana and Uttar Pradesh, including the four million tonnes of summer rice production, is producing a rather large surplus of rice which will be used to meet Bangla Desh needs. In this situation, the nation wide agricultural census which will be completed by the middle of 1973 is essential to plan agricultural growth and stabilise the energing food surplus which is as much linked to the happy coincidence of four successive years of good monsoons as to the new technologies introduced and used. In the State, the agricultural census field operation are now being completed. Data on each operational holding has been collected in the 16,916 villages of Tamil Nadu, involving field work by 15,000 karnams under the supervision of revenue officers and the Statistics Department. Using punch cards, verifiers and mechanical tabulation equipment, the data will be processed and the report ready by December, 1972. Thereafter it should be possible to plan and execute the State agriculture programme more realistically, in preparing district maps and undertaking regular soil testing of each locality, extending the mobile soil, soil testing units beyond the three now approved and the one in operation in Thanjavur; in ensuring optimum use of fertiliser (trebling fertiliser use in the State will increase food production from the current 69 lakhs tonnes to over 100 lakhs tonnes); in extending and generalising multiple cropping from the pilot projects in Madurai, Tirunelveli, Chingleput, Coimbatore, Thanjavur and Tiruchirapalli to all other districts (in fact in Thanjavur district farmers are going in for four crops a year, Karuna paddy, followed by Ponni Paddy, followed by groundnut, followed by the hybrid maize Ganga, as well as raising cotton in rice follows in other districts); in spreading the results of adaptive research undertaken at Kudumiyanmalai and the seed forms; in soil and water testing, farm engineering and devising a working and workable credit structure.

Paddy Purchase: The paddy levy purchases including the 25 percent levy on paddy moved out of the Thanjavur district, referred to in the last issue of the Bulletin (Vol. II No 3), as of February 15 has involved the procurement of 13,456 tonnes of rice (7220 tonnes by the authorised millers, 4,731 tonnes by the Food Corporation of India and 1253 tonnes by the Thanjavur Co-operatives). The State Government has advised FCI to go in for open market purchases to reach its target. At fixed price of Rs. 30 per bag of 57kgs, FCI should attain its target purchase of 30,000 tonnes of paddy, (15,000 tonnes from the open market and 15,000 tonnes from the levy). If the open market purchases at Rs. 30 do not amount to 15,000 tonnes, the price will be raised. This is part of the larger programme of FCI to move about 14,000 tonnes of food grains from the procurement centres to the consuming centres. With the stopping of PL 480 food grains imports, arrangements must be made to move food from the northern growing areas to the southern consuming areas, involving a systems arrangement of railways and shipping transports.

The State Government has in addition established, as from February, a State Civil Supplies Corporation with an authorised capital of Rs. 3 crores for purchase of rice in the

open market. It's major purpose is (a) to build a buffer stock in the State for distribution, particularly to the low income groups in the lean period and (b) maintain prices at a level which would prevent distress sales of paddy by the small and medium farmers. The Corporation is purchasing 8,50,000 tonnes of rice at Rs. 32 per bag of 57 kilos plus 1 Re. for incidentals, during the samba season in the Thanjavur district, in addition to the levy purchase of 30,000 by FCI and a total of 1.25 lakh tonnes during the year. It is also authorised to purchase other essential commodities. It is directed by a Board with the State Food Commissioner as Chairman and the Secretaries of Finance and Agriculture and the Collector of Thanjavur as members. This initiative confirmed in the Budget, is a necessary condition for the further development of food and other essential goods production in the State. The relation of the State Corporation to the FCI with its 25 drier establishments in Thanjavur districts and 40 purchasing centres needs to be worked out. Each can help and support the other – the FCI with its eight years expertise and experience and the State Corporation with its local knowledge and know-how. Both need to decentralise decision making powers to officers on the spot. The other unknown is the purchase price. Here both institutions will have to develop more flexibility than FCI has had in the past, if the double objective of the State Corporation is to be served and if both are to keep their heads above the break even point in competition with the skilled and experienced merchants and local millers.

Cumbu, Grams and Tapioca: In Cumbu production, a High Yielding Variety which can also enable the farmer to produce his own seed is now available in the State. Todate to use Cumbu hybrids which are high yielding, the farmer has had to depend on outside seed farms and merchants because the seeds to be locally grown required special attention. Now with the development of the composites variety which produces seeds true to its parent, the farmer can grow the crop and his own source of seed. The new variety the tall composite, is a heavy yielder—3,828 kg. per hectare which is double the yield of older hybrid—HB-1. The composite tall Cumbu can thus be grown by all our small farmers who cannot go in for costly seeds. As a dry crop it is sown at the rate of 5kg. per hectare with 40 kg. of N and P each and a light of 10 percent BHC dusting. Similarly the new black gram variety Mash-48 which is also virus resistant yields more than 1,000 kg. per hectare and matures in 100 days in dry areas. So too the new green gram release can be harvested in 75 days and yields upto 1,500 kgs. per acre. Vol.I Nos. 9 and 11 of the Bulletin reported on three new varieties of tapioca released in the State. Now a further variety adapted from Colombia has been introduced with double the protein content (3.75 percent) of the other varietes. For our protein deficient State, this tapioca strain together with the three maize varieties and high lysine composites must be developed rapidly and grown widely.

With these important developments on the seed and research front, the actual record particularly in dry farming both in the State and the country is somewhat disturbing. Of the Fourth Plan allocation of Rs. 20 crores for dry farming, (a miserly amount, given the fact that 80 percent of the farmers in the Country and 60 percent in the State are dry farmers), in the first three plan years Rs. 4.50 crores have been sanctioned for 24 projects and only Rs. 50 lakhs actually spent. Of the 24 projects sanctioned, only six are operational. This is really an impossible situation as in dry farming we are in fact dealing with the mass of small poor farmers who constitute the majority of the country's population. A number of remedial measures should be immediately undertaken

to salvage the situation in the last two years of the plan. First the responsibility for planning the project, establishing the conditions for execution and actual selection and approval should be decentralized to the district level. Certainly Delhi should not approve the projects and impose an unworkable uniformity. Even Madras should limit itself to a post audit scrutiny. Second the projects should be located near the major research centres in the State, Coimbatore, Madurai, Salem, Kovilpatti, Kudumiyanmalai etc. Third all rigidities as to the size of project, form of assistance and inputs should be removed and each project must respond to local conditions. A detailed programme for speeding technology in dry farming in Tamil Nadu is set forth in a publication of the Madras Institute of Development Studies which has just gone to press.

Vegetables and Fruits: The Nilgiris vegetable and fruit project is being expanded and developed on a long term basis. The main markets for the hill vegetables have been the subject of a survey and include Madras, Madurai, Tiruchi and Salem. Cold storage arrangements in Ootacamund and Madras are being developed in order to store the vegetables and release them in response to demand without involving gluts and scarcities. Fruit development includes orange plantations in the Kugal valley, Strawberries in Coonoor, and grapes in the low lying areas (the current average grapes yield is 25 tonnes per acre which is over five times the average world yield). Other projects include the cultivation of mushrooms for export, the development of high yielding ginger and barley cultivation in the Kotagiri area to feed a projected malt industry plant. This diversification of production in the area is a part response to the damage caused to the potato crop by the golden nematode pest referred to in Vol. II No. 1 of the Bulletin. The project also includes control measures against the past in which three applications of the nematicide, Dasanit, has proved effective, in addition to which pest resistant potato strains are being developed. The project has been the subject of some discussion and controversy at the recent meetings of the District Development Council which is of some value in so far as it provides it with some much needed attention and publicity. The balance of evidence is that after the usual initial bottlenecks, the programme is on the way to making an important contribution to both producers and consumers in the State.

Coffee and Tea: Despite the forecasts of national coffee production in Vol. I No. 9 of the Bulletin, coffee production during 1971-72 will amount only to 60,000 tonnes, which will mean drawing around 10,000 tonnes from the previous year's buffer stock to meet the internal and export demand. From the 1970-71 crop upto January, 1972, 42,076 tonnes were exported and a further 10,924 tonnes will have to be sold to reach the target of 53,000 tonnes from the 1970-71 crop. In addition 42,000 tonnes have been released to meet internal demand. There is need for improved coffee production in the State and the Country, involving improved cultivation practices, processing equipment and plantation machinery. Tea which is our second largest foreign exchange earning crop (in 1970-71 its export earnings were Rs. 140 crores) is grown over 3.5 lakh hectares and produces 421.8 million kgs. Tea research in the State carried out in the Annamalai Hills laboratories has released 10 tea clones in the last two years which are frost resistant, can be grown at varying elevations from 2,600 to 7,000 feet, capable of yielding 2,500 to 3,000 lbs. per acre (against the Southern average of 1,800 lbs. per acre) and of producing quality tea all the year round. Further techniques have been developed at the Annamalai centre for judging the quality of tea at the bush stage and tea technology now helps to add the required aroma to the tea leaves. Pruning methods have been developed to reduce

woodrot and fungus and increase yield and meet nutritive deficiencies in the plant. Now these many developments need to be widely used in the State and Country plantations so that the growing internal and external demand for tea may be adequately met.

Water: With the completion of ground water exploration in the Thanjavur district, at the end of February, the equipment and trained staff in the project should now be used to conduct similar exploration in other districts, as suggested in Vol. II No. 1 of the Bulletin, so that the Government Water Board may have a complete ground water map of the State to regulate and rationalise the use of our ground water resources. Priority in exploration should be given to the Palar basin where 115 lakh gallons per day is planned for the Atomic Power Plant at Kalpakkam, the Panruti region which is expected to supply 450 lakh gallons per day to meet the needs of the industrial complex around Neyveli, and the Madras region where 275 lakh gallons per day is needed for its industrial complex. Along side of this extended ground water investigation, the Rs. 100 lakh programme of living, special repairs, setting of bunds, and silt clearances of all major rivers in the Cauvery delta will conserve and increase the State's irrigation water resources, The two water programmes constitute an essential base for the State's industrial and agricultural health. Another important programme is the Parambikulam-Aliyar and the Siruvani agreement with Kerala which are essential parts of the total water needs of the State. While the former is being acted upon, there is need rapidly to finalise the Siruvani project so that the Coimbatore area may be served with the 1.3 million cubic feet of water required for its development. A larger perspective is opened by the proposed national water grid ultimately linking the Ganga and the Cauvery. The last issue of the Bulletin (Vol. II No. 3) refers to some of the technical and engineering problems faced by this project and the suggestion that the national project should be executed in regional phases. With the linking of Godavari and Pennar through Pochampad and Nagarjunsagar, a further link with the Cauvery becomes fessible, as part of linking of the Godaveri, the Krishna, the Pennar, the Cauvery and the Kerala rivers. The State Government has made a sound proposal along these lines to the irrigation Commission, a proposal which is supported by engineering and technical studies in the State

Research and Technology: Further to the establishment of the State Agricultural Research Council referred to in Vol. I Nos. 1 and 8, an Additional Director of Agricultural Research has now been appointed to direct the research programmes in the various agricultural research stations directed by the Department. His special attention will be directed to the new research project on dry farming at Kudumiyanmalai and the research programme on irrigated pulses centred at Aduthurai. During this transitional phase when the State has two agricultural research programmes, the Director should maintain close contact with the research programmes of the Agricultural University which should, when fully established, take over all research activities in the State.

Some indication of the technological inputs in the country's farming can be gained from the reported annual investment of Rs. 600 crores by our farmers in major agricultural equipment alone. Against this background, the proposals for a National Farm Equipment Council and a National Institute for Training in Agro services are sound and timely. The Tamil Nadu Agro-Industries Corporation has set up a training centre for agricultural engineers at a cost of Rs. 3.5 lakhs. This programme should be coordinated with the rural engineering survey to produce survey and cantour maps launched by

the Centre which will facilitate rural works, roads, electrification, land use planning, soil conservation and for which a Survey Conservation Training Centre has been established at Ootacamund in the State. In addition the Corporation which has set up six mobile servicing units to repair plant protection equipment of the farmers in the State and which will act as agent for distributing 2½ litres of endrin pesticide, will also be producing and distributing rhijhobial cultures for augmenting the production of the pulse crop which is in very serious deficit in the State (See Vol.I No.8 of the Bulletin)

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Industrial Pointers:

Salem Steel: Progress is registered on (a) the product mix as recommended in the consultants report and (b) the land acquisition programme as required in the reporting on the Salem Steel project in the December, 1971 and last issue of the Bulletin (Vol.I No.11 and Vol.II No.3). The consultant has recommended the production of 2,40,000 tonnes of finished steel using Kanjamalai iron ore to be beneficiated and pelletized as feeding stock for electric smelting furnaces. The hot metal from the electric smelters will be cast into continuous casters and rolled in bar and rod mills and the steel slabs rolled into sheets. Stainless will be produced in scrap from electric arc furnaces. So the product mix will be 1,25,000 tonnes of alloy and steel bar products, 45,000 tonnes of steel slabs and 70,000 tonnes of stainless sheets. The whole project will be power intensive 2,250 units of electricity for one tonne of iron. The project calls for an investment of Rs. 286 crores. The first decisions of the Government on the report include (a) bringing the plant into operation by 1976 (a welcome reduction of three years from the last issue's forecast) (b) starting the plant with scrap and bringing the sponge iron facility based on the Kanjamalai magnatite ore at the second stage (Neyveli lignite is not to be used as reductant) (c) ordering now the main electric smelter, electric motor and LD converter and (d) completing negotiations with the State Electricity Board for a concessional power tariff. The question of ordering the complex equipment within the country raised in the December issue of the Bulletin is still unresolved. The Union Ministry is in favour of maximum indigenous plant and machinery which will make the starting date, 1976, difficult of realisation. Of the 5.50 lakh tonnes of equipment that this and the other two steel plants require, less than 2.50 lakh tonnes can be manufactured by the Heavy Engineering Corporation and about 3 lakh tonnes will have to be ordered from other engineering units within the country. But the time lags suffered by Bokaro in obtaining its equipment from HEC is a clear indication that from the point of view of economy and the imperative of meeting the country's steel shortage, some part of the essential machinery should be imported. The other part of the programme, land acquisition is proceeding well. 1,100 acres of land near Kanjamalai have been acquired by the State Government by early April, at a cost of Rs. 70 lakhs and handed over to the Hindustan Steel Construction Company. Within the project outlay of Rs. 286 crores, Rs. 7 crores is estimated for the development of the township. The 1972-73 National Budget provides Rs. 8 crores for Salem and the other steel plants. There are also surveys underway for an aerodrome at Salem to link the town by air with other business and industrial centres in the Country. In addition to the steel holding company reported in the last issue, the Government has set up the Hindustan Steel Bank of 50,000 tonnes for timely and adequate supplies of all critical categories of imported and indigeneous steel to major Plan projects. This again can be an effective tool to speed deliveries to the plants and a means of rationalising, if not reducing, for 1972-73 the Rs. 200 crores of steel imports with which we ended 1971-72.

Neyvell : The appointment of the Subramaniam Committee to examine the problems and underutilisation of the integrated lignite enterprise at Neyveli referred to in the February issue of the Bulletin (Vol. II No. 2) ought to lead to optimum lignite output and the consequent capacity use of the dependent power, urea and briquetting plants. With all the know-how available in the country and outside today, with regard to underground and open cast mining operations, the two major problems that Neyveli lignite mining faces, namely ground water and the over burden can be successfully analysed and resolved. The immediate objective should be to expand opencast mining. Alongside, the underground water pressure opens up possibilities of using the technology of hydraulic mining employed in many coal fields outside India. Further water, fireclay, chinaclay and lignite which occur together might be treated as an integrated group of exploitable resources and as such it should be possible to move from the present dependence on a single mine to operating a group of opencase and underground mines. A further prospect that the Committee should examine is to relieve the Corporation of excavating and removing the overburden in the mines. This could be commercially undertaken and the Corporation could then concentrate on the fullest integrated use of the four resources, lignite, chinaclay, fireclay and water. The State looks to this investigation as a means of enabling this giant public sector enterprise to operate profitability and expand in relation to the heavy demands on its products, which include energy and fuel. The need for meeting the expanding demand for energy in the State and that of economising on oil as a source of energy are accepted policy. Salem steel is one example of the growth of fuel intensive industries being faster than our fuel resources. In this context, Neyveli could make a sizable contribution to the power and fuel economy and resources of the State.

Boiler Plant : The High Pressure Boiler Plant at Tiruchirapalli will now undertake a first phase expansion programme. The Rs. 4 crores for this programme will be met out of the Plant's own income, a rather unique event in our public sector and which was analysed in the 1972 January issue of the Bulletin (Vol.II No. 1). The current approved boiler capacity of 750 mw of the plant will be increased to 1,500 mw with the installation of more sophisticated machinery and ancilaries. The expansion programme will provide some further employment of skilled technical personnel but as it is mainly a capital intensive programme, its employment generating effect will be through the development of ancillary units around the Plant that it will give rise to. The Plant working to capacity will now be able to meet the order for the seven 200 mw boilers from the State Electricity Boards of Maharashtra, Uttar Pradesh and Gujarat and others which are in the offing. The second Kalpakkam unit will be provided at a cost of Rs. 60 lakhs and not 50 lakhs as reported in the January issue. The Tiruchi Plant and its managment ensure the operation of this undertaking at a high level of economy and efficiency.

Packaging and Plastics : The packaging industry in the State faces an expanding demand as the traditional packaging material such as glass and jute are replaced for functional reasons by paper, other fibres, polythene, polystyrene, P.V.C. and other plastics. The petro-chemical complexes at Tuticorin (See Volume II No 3) and Manali (Vol.I No. 10) will provide in part the raw materials for the existing and new packaging plants. So too the forest based paper and fibre industries to be developed in the State and on which the State Planning Commission is at work will be aimed at this sector. The packaging laboratory that is planned to be established in the State will provide the industry with

valuable consultancy and training services. In so far as plastics are concerned—both these used in consumer electronic products and in civil works and building programmes,—here again the Manali and Tuticorin complexes can meet of the growing demand in the State for the products. There is need for applied research in this field which the complexes can finance through the Plastics Institute and Indian Institute of Technology in Madras.

Handlooms: The handlooms industry in the State as well as in the Country is in serious trouble for several reasons. Out of a total of Rs. 25 crores of exports for 1970 and Rs. 23 crores for 1971, the State exports Rs. 6 crores of handlooms of all categories-garments, cotton and silk dress material, bed covers and spreads, lungis etc. As a result of the 15 percent import duty going into effect from January 1971 in the United Kingdom, two orders worth Rs. 30 lakhs and Rs. 50 lakhs from that country are to be suspended or if maintained, to have their prices lowered by 15 percent to meet the import duty. The negotiations between India and United Kingdom over this levy, over the United Kingdom's offer to exempt one million square yards of cotton and four lakh square yards of silk fabrics are still hanging fire. If there is no early successful outcome of the negotiations, these markets will be lost to China and Hongkong. In any case one million square yards out of 9 million exported is small fish and the real remedy is to search for additional export markets to relieve the present heavy dependence on the United Kingdom. The handloom mission that has been in Australia, New Zealand and Fiji, the one planned for the Common Market and other European countries and the participation of the industry in world fairs in Nigeria, Germany etc. are sound moves and should lead to diversified production to meet differing demands and fashion trends. But the handloom export trade also suffers from internal causes in the State. First the producers in the State are at a disadvantage because all handloom shipments are made from Bombay. With one fourth of the exports emanating from this State, some direct sailing from Madras should be arranged so that the exporters from the State can save on the transport cost to Bombay and storage fees there. Second there is need for yarn prices to be stabilised and for the raw material to be available in adequate quantity and quality to the handloom producers. Attempts are made by the producer to pass on to the importer yarn price rises with resulting loss of custom. This also leads to malpractices, such as under invoicing and production of shoddy goods-which further reduces the demand for our handloom goods. The State has the capacity to produce and export a wide variety of quality handloom goods—from simple to sophisticated varieties. The incentives of the Export Promotion Council are good in so far as its promotional and publicity expenditures and encouragement of bank credit are concerned. The State has distributed Rs. 772 lakhs as loans and given financial aid to weavers co-operatives for purchase of looms and share capital. The Reserve Bank needs to relax its credit criteria for weavers co-operatives. But the major need is for good quality yarn at reasonable and stable prices to be made available to the producer. Here the mills do not supply quality yarn to the handloom producers, and the Central Government encourages export of the best yarn for which purpose there is competition between handlooms and powerlooms. This export of yarn is not economical because the finished product when exported sells at thrice or four times the yarn price. Hence there is a strong case for banning and barning and/or controlling or controlling the expoit of yarn and for the regulation of yarn prices. Too much of our export earnings in the State and Country is at stake for the present inaction to continue.

Transport : Railway developments in the State include the Rs. 50 crore Madras-Vijayawada railway electrification project (Rs. 33 crores for installation and Rs. 17 crores for electrical locomotives). The Madras headquarters of the project will also be in charge of the Madras-Tiruvellore project. The single broad gauge project for the State and Country includes a new broad gauge line between Karur and Dindigul and the conversion to broad gauge of 324 km. on the Dindigul-Tuticorin-Tirunelveli section, for all of which the survey phase has been completed but on which, on the advice of the Planning Commission, work is being postponed. This is regrettable as the industrial growth of the State will be affected by this transport slowdown. Long range railway policy is however, being aligned to the industrial growth programmes and projects are being developed to link the main industrial complexes of the State—Salem, Coimbatore, Madurai and Tiruchirapalli by direct broad gauge line with outlets to ports in the East and West Coast. While rail transport is moving rather slowly, road transport in the State is developing rapidly, particularly reaching out to the vast hinterland with its resources and growth potential which the railways have not yet touched. Even so road traffic is growing much faster than roads. In the four Plan periods, traffic has grown 15 fold. At the start of the First Plan, the State's roads were 21,198 miles, while at the start of the Fourth Plan they were 40,398 miles—a growth of this fold. In the Fourth Plan priority is given to roads development, so that by 1974 the State's road mileage will be 48,434. The employment potential of this programme is high. For every crore rupees of roads, 10,000 man hours are employed and the Fourth Plan in the State will be spending Rs. 40 crores on roads. Its secondary employment effect includes 17 persons per bus and 11 per truck. Work has started on the Rs. 6 crore Rameswaram-Pamban link road project and will soon start on the Rs. 40 lakh railway overbridge at Palakarai in Tiruchirapalli. The 1970-71 Annual report of Madras Port Trust makes encouraging reading. With a net income of Rs. 227.10 lakhs, its receipts were Rs. 1,169.71 lakhs and expenditures 942.61 lakhs. The value of imports and exports passing through the port increased by 4.4 percent over the previous year. The development projects in the port such as the oil dockworks, toe and heel protection, ore handling etc. have been analysed in the last issue and Vol. I No. 8 of the Bulletin. In place of the light house currently operating from the High Court, a new 150 feet triangular shaped light house is being constructed on the marina, opposite to the AIR buildings. This port facility at a cost Rs. 28 lakhs will have a 3,000 watt lamp worked by local electric supply along with a standby generator, and its beacon will function even under adverse seasonal conditions to a distance of 20 miles.

TIDCO : The Tamil Nadu Industrial Development Corporation has announced some six projects at the execution or planning stage in addition to the Tirupattur, Ramanathapuram Rs. 12 crore tube and tyre project and its participation in the Tuticorin complex—both referred to in the last issue of the Bulletin. In the Dharmapuri district, it is setting up a joint sector Rs. 3.5 crores cigarette factory with the production capacity of 4,500 million pieces annually. The plan will go into production in mid 1974. In Madurai a Rs. 10 crores factory to produce annually 2,100 tonnes of nylon yarn is the subject of a feasibility report now under examination. Also in Madurai a Rs. 60 lakhs plant for the daily production or 5 tonnes of chlorate is under study. The Corporation has also received a letter of intent for setting up a Rs. 3 crores plant for producing annually 3,000 tonnes of aluminium floride. Further a Rs. 1 crore project in Madras is being planned for producing annually 3,000 tonnes of basic chrome power for use in the State's tanning

industry. Other plans include a calcium carbide and refractory project in the State. With these plans and projects, the Corporation will be keeping up the industrialisation momentum of the State and its employment generating programme.

Private Sector : The Seshasayee Industries Plant at Vadalur is producing 400 kv. insulators for supergrids to help the Tamil Nadu Electricity Board instal the 400 kv. line between Kalpakkam and Mettur-Parambikulam. This is the first manufacture in the Country of 400 kv. polycone support insulators. It will help the Southern power grid to function more actively than others. The company's capacity is 4,000 tonnes of high voltage insulators and 2,000 tonnes of malleable cast iron components and 500 tonnes of forgings that will be used in this important innovation. A case of product diversification to meet the problem of over capacity is the decision of Dadha Drugs and Pharmaceuticals in Pallavaram to split its present 25 tonnes monthly production of calcium lactate, for which the monthly demand in the country is only 15 tonnes. Hence at a cost of Rs. 5 lakhs the company is installing a lactic acid plant designed from indigenous raw materials with a monthly production capacity of 10 tonnes. This project will save Rs. 15 lakh imports of calcium lactate and lactic acid. E.I.D.-Parry's report as on September 30, 1971 shows an encouraging break through. The latter half of the working period witnessed rapid recovery which has wiped out the losses of the first six months and shows a net profit of Rs. 245.33 lakhs before depreciation and interest charges. If the improved sales realisation, particularly of fertilisers and sugar, are kept up in the current year, the prospects should continue to improve. Southern Asbestos is unable to meet its demand even though its Arkonam factory is working to capacity and so a new unit at the cost of Rs. 85 lakhs is being set up in Dharwar. The location brings with it improved economies of scale and nearness to raw materials source.

Textile Mills and Industrial Relations : The simmering textile labour situation in Coimbatore boiled over in February and 14 trade unions and their 60,000 members in 87 mills went on strike as from midnight February 11/12. The major demand of the workers was the reopening of the closed textile mills. The Tamil Nadu Textile Corporation had taken over 5 mills—Cambodia, Om Praskthi, Krishnaveni Textiles, Sri Ranga Vilas and Sri Murugan (See Vol.I Nos. 7 and 9 of the Bulletin). The issue now relates to seven closed mills—Somasundara, Kalleswara, Coimbatore Spinning and Weaving, Sarada, Balarama Varma in Shencottah, Pankaja and Palamai Ranganathan. In the last issue of the Bulletin, the agreement of the Central Government for the take over of the five of these mills was optimistically reported. The situation at the time of writing in the first week of March was worrying and incredibly confusing. From the third week of February daily reports were emanating from Delhi that the Centre will be taking over six of the seven mills. But while 60,000 workers were on strike, a March 1 bandh in Coimbatore successfully carried out, the strike spread to all textile mills in the State including those in Madurai, there were still a whole lot of procedural delays with regard to the take over of the seven mills. (a) The Foreign Trade Ministry had not yet obtained the concurrence of the Finance Ministry, despite the strong urging of the Planning Commission and its Minister; (b) a formal resolution had yet to be adopted by the Board of Directors of the National Textile Corporation before notification of the takeover could be issued; (c) The Foreign Trade Ministry had to instruct its advocate in Madras to move the High Court for permission to take over two of the seven mills which are in liquidation—Pankaja and Palamai Ranga-

nathan. Meanwhile the State Government on its own had decided to take over one mill—the Somasundra, without waiting for the 51 percent contribution from the Centre and had so telegraphically notified the Centre. This decision meant a State expenditure of Rs. 60 lakhs for its working capital, Rs 30 lakhs for modernisation and meeting the monthly loss of Rs. 1 lakh of the past three years of that mill. In addition the Shencottah Balarama Varma was ready to open on its own and start functioning. But the procedures were interminable and in this context somewhat irresponsible. If these seven mills were reopened, the major demand of the workers and unions will have been met, the crisis relieved and the strike settled. There were eighteen other demands formulated by the unions. The Chief Minister negotiated with the labour leaders and the managements agreement on 16 of these demands and the whole situation could have been brought to normal if the seven closed mills were speedily opened. The other negotiated agreements are: (1) grant of Rs. 3 lakhs (subsequently raised to Rs. 5 lakhs) from the Chief Minister's Relief Fund for payment to unemployed workers through the Joint Action Committee of trade unions and the District Collector, (2) immediate take over and running of three closed mills—Somasundra, Kalleswara and Coimbatore Spinning and Weaving as part of taking over of 6 closed mills, (3) the Labour Commissioner to enquire and make a binding decision on (a) payment of occupation wages for temporary workers and learners, (b) payment of 50 percent basic wage bonus to staff and jobbers, (c) implementing the Second Wage Board award, (d) resolving the dispute as to work load increase, (4) Referral to the Central Government with the approval and support of the State Government of (a) raising the quantum of bonus, (b) increasing the gratuity from 15 days to one month wage, (c) opening of a regional office of the Provident Fund Commissioner (5) Referral to a judicial enquiry committee of (a) wages revision without waiting for the 5 year expiry period, (b) revision of dearness allowance, (6) giving preference to workers' children in filling mill vacancies, (7) women workers to be found alternative employment and not to be retrenched, (8) recovery of Provident Fund and ESI contribution arrears from the employers (9) appointment of ESI hospitals advisory bodies, consulting the Joint Action Committee in choosing labour representatives on the bodies, (10) management to pay workers 10 day full wages as interim relief. As the Central demand of the workers for the reopening of the closed mills had not yet been acted upon, the strike situation continued into second week of March. The employers retaliated by announcing the withdrawal of all their concessions. Subsequently on the urging of the chief Minister the managements returned to the agreement. In this situation it was imperative that the main issue be speedily settled and the daily losses being suffered by the workers, the management, the State and the Country be ended. Every day of the strike involved a loss of Rs 50 lakhs of production and Rs. 6 lakhs as wages. This set back was at a time when there should have been an increased production of mill made and handloom fabrics to meet mounting internal, export and Bangla Desh demands.

Industrial relations in the State generally are in poor shape. There was a general work stoppage all over Coimbatore district except in Erode and Gobichettipalayam on March 1 due to the textile strike. The trouble in the Simpson group of companies continued and work stoppage and violence among workers led to the resignation of the six member committee. 8000 workers in nearly 600 banian factories in Tirupur were on strike in February and March. Demonstrations and work slow down at Neyveli are not helping the Corporation to recover from its huge losses referred to in the last issue of the Bulletin. 1200 match factories in Koilpatti, Sankarankoil, Sattur and Sivakasi closed on February

25 as part of their demand to the Centre to reintroduce the bandoleer system. Graduate teachers went on mass casual leave on February 25 and were planning further fasts and demonstrations for revision of their pay scales. Plantation workers have given notice of strike. The positive trends have been the revival of the Madras Dock Labour Board and the settlement of sugar workers dispute. What the State needs is a period—three years—of Industrial peace. The President has called for a moratorium on all disputes for that period. For this, the follow up of the recommendations of the 22nd meeting of the Labour Board at Madurai with its recommended machinery for grant of recognition of trade unions and sharing of productivity gains between labour and management might be crucial. There is need for free bilateral negotiations and restraint and discipline in industrial relations in the interests of ensuring continued and increasing production and productivity in the State.

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Education and Science :

Educational Reform Proposals: : The State discussion and debate on the future educational model for Tamil Nadu continues. The Union Minister of State for Education, speaking at the Indian Society for Technical Education at the Engineering College, Guindy, proposed a reform of technical education. Developing employment oriented engineering education in the State and Country he pointed out, will involve a training programme that will give the students the skills and incentives to set up small manufacturing, consultancy service units either on their own or co-operatively. This will require a change in curriculum, technology of teaching and social and cultural attitudes. The President of India inaugurating a high school in the city also called for a reform of education in the State, in order to bring it into line with the skills demanded by the economy and proposed that colleges adopt the semester system as a means of promoting student initiative and self-confidence and close relations between teacher and student. The State Minister at the silver jubilee celebrations of an educational trust also referred to the wrong heavy emphasis of the present system on examinations and stated that he was developing a system that would enable the student to develop on his own and do his own thinking. He also proposed wide ranging educational decentralisation and the grant of autonomy to each college to develop its teaching programmes and methods. At a workshop in the city, a programme to assess the non-scholastic abilities of the students to balance the present exclusive emphasis on scholastic attainment has been proposed. The poor performance of students later in life can be traced to poor non-scholastic traits which include hand writing, library work, physical education, reading ability, comprehension and co-operation with others. The Tamil Nadu Polytechnic in Madurai has introduced the "earn while you learn" scheme under which students are permitted to work during leisure hours, 4.30 to 6.30 on working days, enabling them to earn an average of Rs. 100 a month. The SITU Council of Educational Research reports the results of its enquiry into the teaching of international understanding and national unity. It is the subject bias of the teachers who find it difficult to look at other fields or countries when teaching one subject and the lack of readable and interesting books on a wide variety of subjects in Tamil that act as obstacles. In this regard the State government's new syllabus just announced for standards VI to VII makes it objective oriented and aimed at importing the right kind of skills, interests, attitudes and values in students.

Questionnaire Points	All categories combined			Vice-Chancellors			College Students' union			Teachers' Organisations		
	Agreement	*Disagreement*	*No opinion*	*Agreement*	*Disagreement*	*No opinion*	*Agreement*	*Disagreement*	*No opinion*	*Agreement*	*Disagreement*	*No opinion*
(a) Present 11 years School course to be covered in 10 years with appropriate upgrading of curricula etc.	28 (74%)	10 (26%)	—	1	2	—	25 (76%)	8 (24%)	—	2	—	—
(b) Further disaggregation of the present 3 stages school into 5 stages	14 (37%)	22 (58%)	2 (5%)	—	2	1	14 (42%)	18 (55%)	1 (3%)	—	2	—
(c) Out of School Education and Training to be organised in existing institutions with existing staff for Early School leavers	29 (76%)	3 (8%)	6 (16%)	1	—	2	27 (82%)	3 (9%)	3 (9%)	1	—	1
(d) Class IX and X to be designed as terminating Classes	28 (74%)	2 (5%)	8 (21%)	1	—	2	27 (82%)	2 (6%)	4 (12%)	—	—	2
(e) Entire School curricula to be functional in relation to Rural and Urban environments	31 (82%)	5 (13%)	2 (5%)	2	—	1	28 (85%)	5 (15%)	—	1	—	1
(f) All Examinations are to be of internal assessment except for Class X where a combination of internal and external evaluation could be used	33 (87%)	2 (5%)	3 (8%)	3	—	—	29 (88%)	2 (6%)	2 6%)	1	—	1
(g) (i) Out of School Education and Training to be provided for students who leave school, *adults, illiterate,* semi literate and literates	32 (84%)	2 (5%)	4 (11%)	2	—	1	29 (88%)	2 (6%)	2 (6%)	1	—	1
(ii) This programme should be both in general *education and vocational* and professional training leading to educational diplomas	33 (87%)	1 (2%)	4 (11%)	2	—	1	30 (91%)	1 (3%)	2 (6%)	1	—	1
(h) Further disaggregation of Higher Education necessary. 2 years Intermediate + 2 years degree + 2 years Post Graduate pattern	35 (93%)	2 (5%)	1 (2%)	2	—	1	(32 (97%)	1 (3%)	—	1	1	—
(i) The Semester system and its evaluation procedures to be followed in *all* institutions of Higher Education	29 (76%)	5 (13%)	4 (11%)	3	—	—	26 (79%)	5 (15%)	2 (6%)	—	—	2
(j) Research in all sciences (Physical, natural, applied and human) to be promoted, stimulated and co-ordinated	30 (79%)	—	8 (21%)	3	—	—	26 (79%)	—	7 (21%)	1	—	1
(k) More equitable sharing between public and private sources of the total finances of Education necessary	29 (76%)	2 (5%)	7 (19%)	2	—	1	27 (82%)	2 (6%)	4 (12%	—	—	2

Interim report on Census on Educational Reform: The last issue of the Bulletin referred to the State wide census being conducted by the State Planning Commission Task Force on the major lines of educational reform in the State. An interim report considered by the Task Force at its February meeting brought to light the general desire for change among legislative, governmental, university, educational and student groups as shown in the Table on page 23.

Science and Technology : *Science Plan* : The National Committee on Science and Technology is charged with a grave mission. It is no less than a massive research and development effort in which all the scientists and technologists of the State and Country are involved to make possible industrial development and self sufficiency, similar to the parallel achievements in the agricultural field. Now the scientists in the State and Country are on trial. With the present Minister of Science and Technology and his deep commitment to science, they have a last chance to deliver the goods. The Committee has proposed that our public and private sectors allocate one percent of their sales turnover for research and development as one means of achieving industrial self-sufficiency. Another area is the unemployment of our vast scientific resources. The Committee computes that if the short fall in the Plan are made good in its last two years, there will be need for employment of an additional 22,500 scientists and 67,500 technologists to work the R & D for the Rs. 450 crores outlay. The average R & D per scientist or technologist is Rs. 80,000 that are needed for pilot plants, laboratory equipment and technical assistants. The total technical manpower will then increase from 73,600 to 1,60,000 by the end of the Fourth Plan. In this connection the need to orient all our R & D efforts to the precise Plan and development goals has been repeatedly stressed at various science symposia. Today import of chemicals alone costs the country Rs. 200 crores, and import of technology continues. Self-reliance in both spheres involves co-operative research and production to reduce the import bill and the development of a self-reliance scientific communty. In this connection the 59th session of the Indian Science Congress has pointed to past achievements in the geological sciences to guide our future. In 1948, mineral production in the country was Rs. 64 crores and exports Rs. 14.6 crores. Today it has expanded to Rs. 355 crores and Rs. 162 crores. But the country's mineral wealth must also be conserved and that is a part of our scientists.

Pre-stressed Concrete : The international symposium on pre-stressed concrete in February in Madras was particularly timely, as the Veeranam project, of 40 gallons of water per day to the city, will be using 200 km of prestressed concrete pipes from the Veeranam lake to the city. The advantages of this pipe were reconfirmed—cheapness, longevity and hydraulic excellence. Almost on the heels of the symposium, the Tirukalaikunram and Panruti factories have received the West German equipment, so the two factories established at a cost of Rs. 4 crores are turning out 70 pipes a day. Each pipe is six metres long and 1.7 m in diameter. With this facility now established, there is need for continuing research on design and technology choices for these pipes to be used all over the Country as well as in the State. Another important area for further research is concrete poles—their design loads, safety factors and transport and handling. The State and Country will need 4 million poles during the next five years for its rural elecrification programmes. The symposium also devoted considerable attention to the use of prestressed concrete structures—containment, pressure vessels and vessel dome—in atomic energy

establishments. The Kalpakkam structure which uses the containment concept for the perimeter wall—in the interest of safety and economy—can be extended to the dome and used fully for the unit planned in the Southern part of the region. These structures also have high employment potential.

Pollution: Further to the results of the symposium on air pollution in the city reported in the last issue of the Bulletin, a survey of the pollution of the Adyar river released in February traces the very serious health hazard of this city water way caused by the water wastes flowing into the river from the Surgical Instruments, Industrial Estates and Hindustan Teleprinters of the Nandambakkam area, the Saidapet slaughter house and the hides and skins washings. The dissolved ogygen, nitrogen and chloride in the river between Saidapet and Madras makes the river a vast sewage. What is needed is legislative control measures to oblige all industrial establishment in and around the city to treat their water wastes and effluent before they are discharged in the river. This source of water pollution is more easily controllable than the air pollution described in the last issue. The Central Leather Research Institute, Madras which is a pacesetter in transforming its R & D programme into industrial projects in the leather industry, can initiate control programmes in co-operation with the Department of Public Health Engineering and the State Public Health department and diffuse the results among the trade.

Health: The 47th All India Medical Conference held in Madras in February paid a great deal attention to improving the standards of medical education. It called attention to the importance of limiting admission of medical students to medical colleges, in accordance with the Mudaliar Committee recommendations, to 100 students per year. Its recommendations to establish in every State a Medical University raises the same problem of educational and scientific fragmentation that the proposal for the Technical University raises (See Vol. I No. 10 and Vol. II No. 2 of the Bulletin). In any case the establishment of separate universities either on a disciplinary or geographical basis is no cure for falling standards. Another recommendation of the conference is for the nationalisation of health service—a proposal which should stand on its own merit and not to be linked with the unemployment of 20,000 doctors in the Country. This unemployment statistic is a suspect statistic, given the fact that not one of those reporting as unemployed has applied for employment in the Youth Corps, which is now functioning in the State and noted in the last issue of the Bulletin. Over half the doctors in the State and the Country (85,000 out of a total 1,40,000) are private practitioners and these could be employed on a part time basis by the Government in rural areas. That is what the State Planning Commission's Task Force on Health, Nutrition and Sanitation is proposing in the State Perspective Plan as a means of extending the Primary Health Centres and sub-centres in the State. As family physicians, they could also be effective agents in the State family planning programme, which has surpassed its target of 12 lakhs of sterilisation for the year. But the coverage has yet to be extended to 80 percent of the eligible couples. For this the various incentives such as increased cash bonus, the no birth bonus scheme in the Nilgiris, special casual leave and the proper use of medical termination are being extended. The related nutrition programme for pre-school children and pregnant mothers covers 1.5 lakh children and mothers in the State. There are over 300 centres in the State through which enriched bread is being distributed. The Task Force of the State Planning Commission is proposing an integrated programme of public health, family planning and nutrition in the Perspective Plan of the State for the period 1972-84.

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Gandhigram: Gandhigram with its 21 departments and Institutes founded and run by G. Ramachandran and Soundram Ramachandran is one of the State's most effective educational development activities, covering all aspects of economic, social and cultural life. it is celebrating its 25th year this year. The Gandhigram Rural Institute is engaged in wide ranging teaching and education programme with an outflow into rural extension and research in the 28 villages in the Agaram and Silvarpatti Panchayats. Its education programme is pedagogically high level and functional in relation to the needs and realities of the Madurai District and the State. Its studies include socio-economic changes, credit problems of small farmers, the working of the crop loan system, food and family planning expenditure. Its staff and students are a devoted group of learners and teachers. The problem that the Institute faces during its silver jubilee year is to establish itself as a University in its own right with an adequate endowment and appropriate status for its staff and its diplomas. As one of the few institutions which is a model of the kind integrated teaching, learning, and extension that the State Planning Commission's Task Force on Education is recommending, the institution should be helped to consolidate itself during this silver jubilee year. The other programme equally outstanding is that of the Gandhian Institute of Rural Health and Family Planning which was referred to in relation to its pioneering of Sathumavu (the 10 paise infant weaning food) in the last issue of the Bulletin. The Institute has an impressive programme of research in health and family planning; its latest research monograph on the Athoor experience has many useful pointers to the State family planning programme. It organises training courses for health and family planning staff and works closely with the Youth Corps volunteers stationed in its blocks. The Institute's training, research and extension programme is an integrated whole as is every part of the work of Gandhigram.

The Youth Corps volunteers in Ramanthapuram, Tiruchirapalli and Madurai were visited during February. They are living in the villages, are accepted by the people and are engaged primarily in literacy, sanitation, and cultural activities. What is needed is for the agricultural and agro-industrial extension officers of the State and in their locality to use the volunteers, particularly those trained in Botany and Biology and Engineering, to help the farmers in the farming and eduipment problems. Also during February Unesco Manram activities were launched in Tiruchirapalli, Madurai, Virudhunagar and Dindigul with special reference to the International Book Year. Programmes to develop adult literacy, the public libraries, book exhibitions in these towns and districts as part of the Unesco programme of the International Book Year were established.

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Documentation Research and Training Centre:

The Documentation Research and Training Centre of the Indian Statistical Institute founded in Bangalore in 1963 by the Grand old man of library science, Dr S. Ranganathan, runs a post graduate training programme in library science, an annual seminar in documentation and lecture series under the Sarada Ranganathan Endowment. The annual Seminar and Endowment lecture which were planned for December 1971 were postponed due to the Emergency, and held in mid-February under the able guidance of its Director Prof. Neelameghan and the inspiring influence of Dr. Ranganathan. The seminar brought together some fifty library and documentation

specialists from all over the couutry, from governments, science and technological laboratories and public and private sector enterprises. The seminar had a well prepared set of papers on Abstracting, Indexing, Reviewing Periodicals and Comparative Study of Schemes for Library Classification with a series of propositions which were discussed and adopted as guides for action. The endowment lectures were delivered by Mrs. Kumar, Librarian, British Council, Madras, on Library Reference Services. At a time when science information and documentation is moving at a pace where Unesco has launched the World Science Information System (UNISIST), the work of the Centre will help the librarians and documentalists in this Country to keep abreast of the latest development and service the subject specialists in the most effective manner possible.

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Study of Education of Scheduled Castes :

As part of the study of the Education of Scheduled Castes in Tamil Nadu which the Madras Institute of Development Studies is undertaking for the Indian Council of Social Science Research, with Prof. S. Ramanathan, former Director of the Madurai Institute of Social Work, Madurai as project Director, (see Vol.I No. 10 of the Bulletin) the Institute has accepted to prepare an economic profile of the Scheduled Castes in the State. The main foci of the economic profile will be (a) the ecnomic problems of the scheduled castes qua scheduled castes, (b) the hierarchy of occupations to members of the scheduled castes or the designing of certain occupations and industry as scheduled occupatons and industry, and (c) the effects of changes in traditional occupations; (One of the Gandhigram studies refers to the effect of energisation of well irrigation on the 300 cobblers (chackalis) who worked on the leather bucket under lift irrigation and the difficulties that their resettlement and retraining schemes are facing); (d) wage discrimination in the labour markets; (e) employment discrimination (treating the scheduled caste workers as marginal workers). Information will be drawn mainly from the 1961 census report Part II B-1 and B-II and General Economic Tables Part III-Household Economic Tables, Part V (a) (i) and (b) ethnographic studies, Part VI village survey monographs, Part VII (a) Handicraft surveys monographs, supplemented by such studies and survey of scheduled castes undertaken by the Universities, Sri Ramakrishna Vidyalaya and Gandhigram in Tamil Nadu. The study will also indicate the current data on the economic activities of the scheduled castes, the gaps in the data which can be filled through the primary data available with the Registrar General or the NSS and formulate hypothesis and concepts for verification through further field studies. The study will be completed by October, 1972.

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Second Workshop on Economics Research Methodology :

As of mid March, the progress of arrangements for the Second Workshop on Economics Research Methodology to be held in Andhra University, Waltair under the direction of Prof. B. Sarveswara Rao, Professor & Head of the Department of Economics from May 8th to June 17th is as follows :

Participants :

The following Ph. D. scholars have so far registered.

	Name	*University*	*Subject*
1.	Mr. V. Gandhi Babu	Andhra	Savings and Capital Accumulation in India
2.	Mr. B. Bhaskara Rao	Andhra	Agricultural Production Functions
3.	Miss B. Kusumakumari	Andhra	Incidence of the Budgets
4.	Mr. P. Adinarayana	Andhra	Role of Anakapalle regulated Market and Co-operative Marketing Society in Marketing of Gur
5.	Mr. P. Jagannadhacharlu	Andhra	Long term finance for agriculture and land mortgage banks
6.	Mr. C. Harichandran	Annamalai	Panchayat Finances in Tamil Nadu
7.	Mr. A. K. Ramalingam	Annamalai	A study of Fluctuations in Land Values in Chidambaram Taluk.
8.	Mr. M. I. Ipe	Karnatak	Growth & Problems of the Rubber Industry in India
9.	Mr. S. G. Gambhir	Karnatak	Economics of Silk Industry in Mysore State
10.	Mr. S. G. Sholapurmath	Karnatak	Agricultural Finance through Co-operative Societies in Mysore State
11.	Mr. V. S. Angadi	Karnatak	Investment and Location in Sugar Industry in Mysore State
12.	Mr. V. Balakrishna Nair	Calicut	Problems and Prospects of Timber Industry in Calicut
13.	Mr. Thomas Varghese	Kerala	Land Reforms and Socio-Economic Change in Kerala
14.	Mr. R. Kesav	Mysore	Agriculture and Balance of Payments with Special reference to India
15.	Mr. M. Padmanabha	Mysore	Finance of Mysore State
16.	Prof. K. Rajeswaran	Madurai	Sivakasi Match Industry
17.	,, P. Sumangala	Madurai	Cost-Benefit Analysis of Family Planning
18.	Mr. V. V. Singh	Madurai	A Quantitative Economic Analysis of Allocation of Resources in Tamil Nadu
19.	Mr. B. C. Moses	Madras	Industrial Economics
20.	Mr. B. S. Nagarajan	Madras	Agricultural Economics
21.	Mr. K. Murukadas	Madras	Development Economics
22.	Mr. K. Rajamanickam	Madras	National Income and Social Accounting
23.	Mr. G. Elumalai	Madras	Regional Economics
24.	Mr. C. B. Dayalan	Madras	Monetary Economics
25.	Miss K. Geervani	Sri Venkateswara	Burden of Public Debt in India
26.	Mr. K. Lakshmaiah	Sri Venkateswara	Regional Economics
27.	Mr. P. Doraswamy Naidu	Sri Venkateswara	Not indicated
28.	Miss A. Krishnaveni	Sri Venkateswara	Nil

The Resource Personnel attending the workshop are :

May 8 — 14	Dr. A. Ramaswami, Prof. & Head of the Department of Economics, Annamalai University, Annamalainagar, Chidambaram.	Dr. Malcolm S. Adiseshiah Director, Madras Institute of Development Studies Gandhinagar, Madras.
May 15 — 21	Dr. V. Shanmugasundaram, Prof. & Head of the Department of Economics, University of Madras, Chepauk, Madras-5.	Dr. C. T. Kurien, Professor of Economics, Madras Christian College, Tambaram, Madras-59.
May 22 — 28	Dr. S. C. Joseph, Professor of Economics, Madras University P. G. Centre, Tiruchirapalli-1.	Prof. T. V. S. Rammohan Rao, Asst. Professor of Economics, Indian Institute of Technology, Kanpur.
May 29 — June 4	Prof. P. R. Brahamananda, Department of Economics, University of Bombay, Bombay 32 BR.	Prof. S. K. Bhattacharaya, Head of the Department of Economics, University College of Arts, 56-A, Barrackpore Trunk Road, Calcutta-50.
June 5 — 11	Prof. A. Neelameghan, Documentation Research & Training Centre, 112 Cross Road 11, Malleswaram, Bangalore-3.	Dr. N. Srinivasaraghavan, Department of Economics, University of Madurai, Madurai-2.
June 12 — 18	Dr. S. N. Sen, Vice-Chancellor University of Calcutta, Calcutta.	Prof. K. S. Sonachalam, Sivagiri House, Courtallam P.O., (Via) Tenkasi Junction.

Also Professors and Staff of Statistics section of Andhra University.

The basic papers being prepared for circulation on April 1st to the participants and resource personnel are :

1. *The Latest Development in Economic Theory :*
   Dr. V. Shanmugasundram,
   Prof. & Head of the Department of Economics, University of Madras, Chepauk, Madras-5.

2. *Identifying Economic Research Themes :*
   Dr. C. T. Kurien,
   Professor of Economics,
   Madras Christian College,
   Tambaram, Madras-59.

3. *Formulation and Testing of Hypothesis :*
   Dr. K. Krishnamurthy, Senior Fellow,
   Institute of Economic Growth,
   University of Delhi, Delhi-7.

   Dr. Kamala Prasad,
   Head of the Department of Humanities and Social Science, Indian Institute of Technology, Kanpur.

4. *Use of Statistics :*
   Dr. Taresh Maitra,
   Economic Research Unit,
   Research and Training School,
   Statistical Indian Institute,
   203, B. T. Road, Calcutta-35.

5. *Use of Case Studies :*
   Prof. K. S. Sonachalam,
   Sivagiri House, Courtallam P.O.,
   (Via) Tenkasi Junction.

6. *Use of Survey Methods :*
   Dr. B. Sarveswara Rao,
   Prof. & Head of the Department of Economics, Andhra University, Waltair

   Dr. H. M. Gopal,
   Department of Economics,
   Mysore University, Mysore.

7. *Use of Census Data* :
Prof. Pravin Visaria,
Prof. of Demography,
Department of Economics,
University of Bombay,
Bombay 32 BR.

8. *Use of National Sample Survey Data* :
Prof. Ekambaram,
Statistical Consultant,
State Planning Commission,
Ezhilagam, Madras-5.

9. *Use of Documentation* :
Prof. A. Neelameghan,
Documentation Research and Training Centre, 112 Cross Road 11,
Malleswaram, Bangalore-3.

10. *Forecasting and Model Building* :
Dr. Srinivasaraghavan,
Department of Economics,
Madurai University,
Madurai-2.

11. *Project Evaluation* :
Prof. S. K. Bhattacharya,
Head of the Department of Economics,
University College of Arts.
56-A, Barrackpore Trunk Road,
Calcutta-50.

12. *Structure of a Ph. D. Thesis* :
Dr. A. Ramaswami,
Prof. & Head of the Department of Economics, Annamalai University,
Annamalainagar,
Chidambaram, S. A. Dt.

13. *Agriculture Economics* :
Prof. G. Parthasarathy,
Head of the Department of Co-operation and Applied Economics,
Andhra University, Waltair.

14. *Monetary Economics* :
Prof. P. R. Brahamananda,
Department of Economics,
University of Bombay,
Bombay 32.

15. *Development Economics* :
Dr. S. C. Joseph,
Professor of Economics,
Madras University P. G. Centre,
Tiruchirapalli-1.

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March Madras Development Seminar :

The March seminar paper—**Automation and Computer** Technology—by Professor S. Sampath, Deputy Director, Indian Institute of Technology, Guindy, Madras, together with a summary of the discussion at the seminar chaired by Professor Alladi Ramakrishnan, Director, Institute of Mathematical Sciences, Madras appears as the main article in this issue.

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Second Article :

In continuation of the commemoration of 1972 as the International Book Year, a further article, Realisation of the Book Plan, (following the one in Vol. II No. 2 of the Bulletion) appears as the second article.

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Correspondence :

A farther report from the Osmania Research group appears under this section.

AUTOMATION AND COMPUTER TECHNOLOGY

By

PROF. S. SAMPATH

Deputy Director, Indian Institute of Technology, Guindy, Madras-36.

I. AUTOMATION

The Significance of Automation :

1.01 One of the major thrusts of modern science and technology has been in the direction of the creation of machine-systems capable of performing many of man's important functions. As examples of these systems, we have radar that extends his vision, telecommunication devices that extend the range of his speech and hearing and electric power-devices that extend the range of his energies. There is also the interesting and challenging area in which he is endeavouring to extend the power of his nervous system and his thinking and decision-making faculties through a process called 'automation'.

1.02 The term 'automation', invented some fifteen years ago in the automobile industry in an effort to find a term more impressive than 'automatic', has unfortunately a lingering association with 'automaticity' which implies mechanization, suggestive of dull, unthinking and repetitive motion and conjuring up an image in which gadgets reign supreme and men stand by watching instruments and pushing buttons.

1.03 Sir Leon Bagrit, in his Reith Lectures of 1964 ('The Age of Automation'), made a plea that the word 'automation' be substituted by the term 'cybernation', in order to underline its association with the mind and genius of the scientist, Norbert Weiner who put forward the concept of 'Cybernetics' and laid the foundation for the proposition that automation is a process which integrates the sensing, thinking and decision-making elements of the system in operation. Its chief characteristic is that a continuous study and acquisition of knowledge of the functioning of the system take place, enabling the most appropriate corrective action to be decided upon and implemented in time. There are three major functional processes involved—computation, communication and control. Because of the flexibility and adaptive nature of the operative system, automation enables man to work at the pace that he chooses. It sets up a machine that collects information, analyses it and suggests a course of action; it does not say : "I won't wait ". In each situation, by careful study and prior planning, the machine is allotted those parts of the task that it can perform best and the integrity and importance of final human judgment and decision are preserved.

The Use of Automation :

1.04 It is an interesting thought that we will all willingly accept only a limited degree of automation in our lives. We would feel safe in an aircraft flown by the autopilot only provided we know that there is a human pilot present to take care of emergencies. None of us will want to ride in a completely automatic train because, in our hearts, there is a basic fear that all things mechanical will fail some day.

1.05 **Aircraft in flight**: Yet in the supersonic age of air-travel, two planes that approach each other do so at speeds so great that the human pilots cannot see each other's aircraft in the event of a collision. These aircraft have to have automation built into them. The approach of the other aircraft is automatically signalled to the pilot by the electronic extension of his seeing faculties. If he notes on his radar screen that there is a hazard of some kind, he knows what exactly to do because the possible lines of action have been studied in advance and the best choice decided upon already. The pilot is there to safeguard the proper functioning of the whole apparatus entrusted to him. He is a part of the automation process and is playing his role as a fully responsible efficient human being. This is a situation where there can be no debate as to whether it is desirable to use automation or not. Without automation, the system does not exist.

1.06 Let us look at another situation where the use of automation is optional and it serves to save time and upgrade the efficiency of the human operator.

1.07 **A Trainer System**: The School of Medicine, at the University of Southern California, uses a computerized medical device called 'Simulator', for imparting training to anaesthetists. The Simulator is a life-like manikin that responds in many ways like a human patient. It is provided with a heart-beat, pulse and blood-pressure. Its chest moves as if it breathes. Its eyes dilate and blink. Muscles twitch. The skin looks and feels like human skin. The mouth opens and closes. There are teeth, a tongue and vocal chords.

1.08 The manikin is used to train anaesthetists in a complex technique which calls for slipping a tube into the patient's wind-pipe to administer anaesthetic gases through it directly to the lung—a procedure used in cases of major surgery. Formerly the delicate procedure took the training physician three months to master. But with the Simulator, three days of instruction and practice are enough. While the trainee practices, the instructor monitors every step at the control-console. The instructor can talk with the trainee, stop the procedure at any point for any length of time and resume or start all over again—steps which are obviously impractical with a real patient. By pushing appropriate buttons, he can increase or decrease the robot's heart-rate, blood-pressure or respiration and cause, at will, any emergency, vomitting, heart-stoppage or shock. These can be repeated over and over again, to impart thorough experience to cope with such cases which may arise in practice. The associated computer will print out details of every occurrence and make possible a thorough analysis of the trainees' performance and promise.

1.09 **Industrial Operations**: The human being is not well adapted for sensing or measuring quantities accurately and repetitively especially where two or more variables are involved. The need for him to be a part of the machine-system to control certain situations has been a formidable barrier to progress. New man-machine relations are possible in the control of processes and operations which hitherto depended on unaided man as the controlling agent.

1.10 Industrial process-control offers many examples of an interactive situation that involves a complex operating system with an interplay of several environmental factors, with a good pay-off in store for a realistic prediction of behaviour and an intelligent choice of action-paths amongst available alternatives. The time-constants of the system are such that a fast-acting computer rather than the human being is required to be a part of the feedback-loop that generates corrective action.

1.11 There are situations involving management decisions—for example, the implications of a new inventory policy or product mix or production method, where a realistic model of the system and its trial by simulation on a computer may be rewarding. The time-constants pertaining to this area will be different from those pertaining to process-control operations. Yet automation is essential to produce an interactive situation in which corrective action will be possible before it is too late.

1.12 The Oil Industry affords a good example of the benefit that may be reaped from the use of automation. In the Control-room of the Refinery, all the variables and processes are measured on instruments. The operators look at these readings, integrate all the information that is available to them, decide on what changes should be made, make these changes and observe the consequential results. At this point, they are the decision-makers. The process is exacting, tedious and slow. If computer-control is made a part of the system, the computer elements will not only get all the variables read continuously, accurately and at great speed, but will present, on an instantaneous basis, a full picture of what is happening in the Plant as a whole. The computer not only presents the readings of the various individual instruments but quickly works out their meaning and inter-relationships.

1.13 A similar situation is encountered in the complex and skilled operation pertaining to the working of a Blast Furnace in a Steel Plant. Integration of information and rapid-decision-making are the essence of the problem, to ensure efficient operation of the Furnace in relation to the next stage in the process. A computer, which is made a part of the system, can make a large number of intermediate decisions and present the management-staff immediately and continuously with all the information that will enable them to make the final decision. While information moves from one part of the manufacturing unit to the next and is fully integrated into each new operation, the result of each change is fed back to the beginning and further adjustments are constantly made so that the operation of the entire process can be maintained at a high level of efficiency.

1.14 Provided with this kind of assistance, the Plant Managers are free to concentrate on making policy-decisions and on changing the decision recommended by the Computer if they feel that these do not make the best sense. Without the aid of automation, they are obliged to make decisions on the basis of scanty and distorted information available to them and their own intuition and the wisdom of past experience. The Computer-aided Manager is in a different position. Before he gets the information, it is processed and digested and many routine decisions left to the computer are already completed, presenting him with only the essential facts and the choices to be made together with a prediction of the outcome of each of these choices. The computer sets up a realistic model of the system and makes meaningful forecasts of the outcome of proposed future lines of action.

1.15 The field of medicine offers many attractive possibilities for the use of automation.

1.16 **Computer in Medical Diagnosis**: Dr. Schmid, a private doctor in Vienna, has installed a computer in his office. This machine is equipped to run an automatic and complete registration of all his patients, their symptoms and treatment uptodate. It prints out suggested diagnosis. When a new patient comes in, he is led to the Computer-

Room where he is given a packet of cards with questions written on them like these—Have you suffered from Typhoid? Is there heart ailment in the family? Do you suffer headaches—in the mornings, in the afternoons? Pain in the shoulder—right or left? Do you sleep well? Do you have pain in the abdomen, if so in the upper, middle or lower part? The replies on the cards, namely, "Yes" "No" or "I do not know" are analysed by the computer. The Computer writes a case-history of the patient, lists the significant symptoms, adds correlated proposed diagnosis. When Dr. Schmid sees a patient, he has at his disposal a careful first analysis of the case. He can order a set of clinical tests if he feels the need. From hundreds of symptoms and data on diseases stored up in its memory, the Computer often comes up with a combination which the medical expert hardly thought of. "A good doctor can diagnose 70 to 80 percent of the cases correctly" says Dr. Schmid. "With a Computer, this rate can be pushed to 95 percent." He istued a questionnaire to 2000 patients treated by him. They were asked to answer the following question: "If you fall ill again, would you prefer your case to be diagnosed by a doctor or a Computer?" Dr. Schmid reports that an overwhelming majority of the questionnaire forms contained this answer: "By a doctor with a Computer".

1.17 In many advanced countries, automation specialists and medical experts are working together to develop methods of speeding up administrative procedures, diagnostic methods and research programmes. Computers are increasingly put to work to search and tabulate medical record libraries, carry out statistical analysis and help to plan treatment schedule. Hospital services have begun to experience the benefit of the approach, built on automation, for dealing with admission, treatment, pharmacology, dietetics, clinical laboratory, wards, administration and research departments, each of which uses some part of the patients' data. Doctors' and Nurses' times are saved by using methods of automation to collect, record, edit and transmit appropriate data amongst the various Departments of the Hospital,

1.18 In medicine, as in other fields, human judgment, however, must still remain the final arbiter. The instinct, skill and experience of an outstanding physician will still be invaluable in arriving at the correct answer, but the use of computer aids ensures that no important possibility is over-looked. The usefulness of the computer could be extended to cover not only symptoms and diseases but also tests, allergies and case-histories of treatment. The information would be continuously updated by the mass of clinical experience fed into the computer system. For research in medicine, methods are already under way for correlating lines of investigation and their results on a world-wide information-sharing basis. This opens up the possibility of ready access to data which neither the practising doctor nor the individual research worker could get without the existence of an outdated system. Undoubtedly this is one of the most fruitful fall-outs from automation technology, with profound implications for the welfare of the human race.

The Challenge of Automation:

1.19 A great many disciplines and techniques are necessary for the successful introduction of automation. Whether it be the working of a large and complex industrial plant or the Simulation of a big-sized management-system, we need people with expert knowledge in such areas as operational research, information analysis, queueing theory and allied mathematical concepts. We need competence in observation, record and control pertaining to areas such as the following: production planning, inventory control, production scheduling, linear programming, project management and simulation technique.

1.20 *Automation* is not a mere matter of 'hardware' or machines. One cannot simply buy and instal an electronic computer and hope that all the worries are over. The successful application of automation is a combination of the right equipment for the purpose — 'hardware', and adequate thought and intelligence in using it — 'software'. An automated system may turn out to be a disastrous failure if those who invest in it lack the outlook and the understanding to handle it. Its proper use for the enhancement of the welfare of our society is among the greatest challenges of our time.

II. COMPUTER TECHNOLOGY

The Advent and Growth of Electronic Computers:

2.01 The heart of most systems of Automation is the Electronic Computer. It is the outcome of one of the most remarkable intellectual ferments that the world of science has witnessed. First used for scientific and research purposes, it has been rapidly adapted for use in business and Government administration. Today, it is used everywhere—in the physical, social and life-sciences; in engineering and manufacturing; in the private and public sectors. In less than 2 decades since it began to operate, there have been 3 full *generations* of machine evolution (Annexure I).

2.02 In the forties of this century, a class of machines described as Analog Computers were very popular and had many useful roles to play: as research tools, as functional parts of military and industrial control-systems; as a tester of physical hardware; as a trainer of personnel and as a teaching aid. In a study of any given system, the computer configuration became the analog of the system. As one learned to interpret the computer solutions, one began to view the computer as the system itself rather than as its abstract analogy. This resemblance constituted the fundamental characteristic of the Analog Computer and was responsible for its value as a design and analysis tool.

2.03 In the early fifties, electronic digital computers were commercially produced and became available, and, because of their ranges of accuracy and versatility, began to overshadow the analog computers. In using these computers for solving problems, the techniques of 'numerical analysis' assumed importance.

2.04 The sixties ushered in the beginning of the soft-ware boom and the devising of algorithms for the computerization of wide range of physical and engineering problems. It was realized that if computer systems were to play a broad-based role, particularly in education and research, an easier mode of communicating with the machine had to be devised than by using the machine language which involved writing of the procedure in terms of the numerical instruction codes appropriate to a particular machine. This led to the development of user-oriented languages shielding the potential user from the idiosyncracies of a particular machine—languages for scientific and engineering applications (FORTRAN, ALGOL), for business application (COBOL), Library and documentation work (SNOBOL), social science (GPSS) etc. In each case the computer language is akin to the language of the professional in the relevant area. These languages opened up many avenues of computer use, for a variety of users in many disciplines. In the meantime, technological innovations were enhancing the speed and the storage capacity of the computers on a scale not dreamed of before.

2.05 We may expect that, during the seventies, the gains of the sixties will be consolidated and the application areas will grow bigger and bigger.

2.06 The methods of analytical solutions of equations will be replaced by computer-aided numerical solutions backed by more intensive training in the conceptual aspects of applied mathematics. The time-honoured linearization approximation of systems will be replaced by computer methods based on non-linear mathematics. Before computers were available, approximations had to be made to achieve solutions—owing to lack of suitable analytical techniques and due to the sheer enormity of the calculation that would result from the use of a realistic model.

2.07 Where computer is available, a number of new methods of problem-solving become feasible, namely CPM and PERT techniques for the planning of large-scale projects and the optimization of resource-allocation.

2.08 Studies in environmental sciences, like meteorology, atmospherics, hydrology, oceanography, ecology and space science have to take into account large masses of data obtained from routine measurements. Statistical studies and data-storage facilitated by computer systems, are becoming indispensable in these areas.

2.09 Till computers arrived on the scene it was difficult to introduce quantitative concepts in social sciences and economics, as these are characterized by complex, non-linear relationships among stochastic variables and are not easily amenable to analytical treatment. Computer-aided analysis has stepped in to convert sociology, psychology and economics into quantitative sciences—sociometry, psychometry and econometry. In the seventies, it is to be expected that sociologists, economists and behavioural scientists will resort in an increasing measure to computer-similator of complex systems.

2.10 **New Vistas of Computer Utilization**: In all its major functions, including applications such as library information service and language translation, the computer is only responding to rules of behaviour incorporated in it and makes use of the extensive data that may be stored in its memory. But where a revolution is now on—which puts the computer in a different class from anything which man has invented before, is in its ability to learn. Initial work on such machines has been done by instructing them to play games—like draughts and chess. In a sense, computers in this category are being taught to write their own programmes.

2.11 Considerable success has been achieved in the area of computer-aided circuit design. Here the users present a circuit configuration in pictorial form to the computer and feeds into it information on the desired performance features. The computer quickly works out the component values. The next step is for the computer to suggest a better circuit configuration than the one proposed by the customer for achieving his objectives. Such a step is already within sight.

2.12 We are on the threshold of a development in which computers will design other computers deciding on the most efficient lay out of components, distribution of resources etc. John von Neumann, the eminent mathematician, showed theoretically that, above a certain size limit, it becomes possible for a computer to design a better computer than itself. This size-limit has not been achieved yet.

2.13 There is concurrently a continuing effort to create machine-systems that imitate human attributes like speaking, seeing and hearing. Work on speech-synthesis is motivated by possible economies that may result from sending only basic speech components across appreciable distances and reassembling them at the other end. The drive to equip computers with sight is strong because of the time wasted in feeding the machine with data. A system has been designed which reads printed matter—addressograph-plates at 12,000 words per minute. When a machine meets a damaged, displaced or obscure letter, it subjects it to a series of tests and decides on the most probable interpretation. A machine can read an ordinary-sized book of 300 pages in about 70 seconds, provided the pages can be turned fast enough. There is a reading machine commercially available that turns printed text material into punched tape that can be fed directly to a computer. Machines are under development that will read hand-writing.

2.14 These are all part of a many-pronged attempt to develop a general-purpose computer which will be easy to programme and communicate with, so that its services can be made available as a kind of public utility. Time-sharing techniques will enable a large number of people to use a single computer simultaneously; to write a master-programme that will allow people to do their own sub-programming; to communicate with the computer by simple language; to develop a library of programmes of general usefulness any of which will be easily available through its code name.

2.15 The most far-reaching use of the new generation of computers will be the retention and communication of information of all sorts within a national, and possibly a world-wide, information system—enabling people at all levels to take decisions on a much more informed basis than hitherto.

2.16 A new range of possibilities is being opened up by the development of extremely small computers using micro-circuitry developed for communication system in confined spaces like aircraft and guided missiles. The availability of general-purpose computer in small sizes is transforming computer philosophy. In the course of the next few years, new techniques will enable computers to be made that can be carried about and used in situations which seem wholly impractical to-day.

2.17 In many industrial and commercial applications, there is a shift away from the larger centralized computer-systems toward much simpler, decentralized units through the exploitation of small, inexpensive special-purpose units. An important factor in their favour is that, in the majority of cases, these units will not require expensive or complicated electro-mechanical peri-pherals which would be difficult to fabricate in a country like ours. The advent of integrated circuits, and particularly large-scale-integrated circuits, has greatly simplified their design and enhanced their reliability. Irrespective of environmental and operational conditions, these can operate as versatile sub-systems for a very wide variety of applications.

2.18 This trend will allow an engineer, familiar with his own industry and its technology, progressively to build up anything from a simple process-controller to full automation of the plant in progressive steps. A start may be made with a modest capital outlay, with the understanding that any extension of the system is achievable on the basis of later experience and felt needs. This approach will ensure security in operation and allow individual managers to be in intimate touch with the processes and the men under their control.

III. AUTOMATION AND COMPUTER TECHNOLOGY IN DEVELOPING COUNTRIES—OPTION AND GUIDING PRINCIPLES

3.01 Decisions on where computers can be used to maximum advantage in the context of the needs and aspirations of developing countries bristle with difficulties. The answers are dependent on which sector of the national economy needs strengthening, and on national priorities and the political, social and economic consequences of the steps being taken. It is also heavily dependent on the availability of trained manpower.

3.02 The most important basic requirement is training and education in computer technology so that applications relevant to development may be discerned with clarity. Next in importance is the creation of computational facilities and the provision of ready access to them. Other associated needs are: the creation of good data-bases and information systems which need not be computer-based but must be reliable; and the nurturing of a whole host of related disciplines where computer-aids will be used, such as management science, statistics, operational research etc.

3.03 The single most important factor is the caution that has to be exercised with regard to the operational effect of computer usage on employment opportunities.

3.04 It has been the experience in some industrialised countries that the onset of computer technology produces effects similar to those of other technological changes. In these countries, the conversion of office-work to automatic data-processing has been possible through the devising of training programmes which resulted in providing manpower for new jobs and in providing work for those whose previous jobs ceased to exist. Computers in these countries are beginning to displace others besides clerks, office-workers and middle-management personnel—such as those working in process-control industries, type-setting jobs etc. Industry and Government are both busy devising measures to cope with these job dislocations.

3.05 But these experiences and the remedial measures adopted are not valid for developing countries—because of difference in population, educational opportunities, mobility, job security and other socio-economic factors affecting the functioning of the labour-force in these countries. Reducing labour costs, which may be a dominant reason for installing automatic equipment in an industrialised country will be a disadvantage in a developing country where any move which results in a loss of jobs will have to be viewed seriously against the background of the high level of the human and social cost of unemployment and retraining. The installation of computers to do office-work and even process control operations or engineering calculations will present difficult options.

3.06 At present computer utilization suffers from an excessive pre-occupation with commercial data-processing problems—such as sales-accounting, inventory and production-accounting and pay-role processing. The reason for this is that the information handling capacity and speed of computers tend to be rather well-utilized in routine applications of this type. The impact of computers in transforming the technological infra-structure through computer-aided design, inventory-control, production control etc. and decision-making through Operational Research, Simulation Techniques and Optimization methods are relatively small. The real worth of the computer lies in its ability to yield information of a type which enables the user to evaluate action-alternatives. This capacity unfortunately tends to be under-utilized due to the misplaced emphasis on the quantity rather than the quality of the information fed into the computer and taken out from it.

3.07 It is well recognized that computer technology is one of the complex features of automation which will continue to baffle and challenge those who are working toward the raising of living standards in developing countries. Serious-minded people have considered the basic problems and there appears to be a general consensus on the following lines :

Automation and computerization are inevitable in situations and processes where human operators cannot perform the tasks without machine aid ;

automation and computerization may be desirable in situations where the cost of using the machine is no higher than the cost when human operators are used, but they shall not be used merely for the sake of prestige or for giving the impression of being modern ;

automation and computerization should not be resorted to when they serve only as labour-saving devices ;

automation and computerization will be essential for the production of goods that are to be competitive in international trade;

computerization should be strongly supported as a national policy for research-oriented and scientific work ;

computerization will bring in many rewards if used intelligently in relation to control—of processes and of systems such as production planning, production scheduling, inventory management, project management, etc. and modelling of large systems, lineary programming and operational research techniques. At the national level, the kinds of problems that can be approached profitably through computer-based studies are : data on availabilty and deployment of natural resources ; problems of electric power mix for various regions — thermal, hydro and nuclear ; census operations : study of the likely effects of tax increase, imposition of a selective excise duty, devaluation and the like ; family planning programme.

3.08 At a recent conference in Bombay, many representatives of commercial organizations, carrying the responsibility for computer-based operations in them, voiced the feeling that there should be no blanket restriction placed on the purposes for which computers could be used and that it should be left to the individual discretion of the organization to use computer-aids in the way they considered best within the framework of an over-all objective. It was stated that, unless even the routine operations like pay-roll processing and sales-accounting were carried out on a computer, the information-system, from the point of view of planning for the future, would be incomplete and constitute a serious handicap.

3.09 In the national context, there would be serious objection to the use of a computer merely for the purpose of carrying out these routine tasks, however efficiently and whatever the saving. But if this is only a subsidiary use and the major utilization is in the direction of more meaningful tasks—in control, simulation and planning, the loss of jobs is not likely to assume serious proportions and for those who are displaced there is the likelihood of alternative positions requiring higher degrees of skill. This is the kind of transformation that developing countries should subscribe for if they are to become the true beneficiaries of science and technology.

3.10 It is of vital importance that due emphasis is placed on the education of the labour force and people at various levels of management with regard to the true implications of computer technology.

3.11 The decision to prohibit the entry of a computer-system, justifiable on a short-time basis, cannot stand for all time. Developing countries should be seriously concerned with the steps that they should take to be ready to use automation and the relevant computing equipment when conditions improve and become more favourable than at present.

3.12 Prof. M. G. K Menon, Chairman of the Electronics Commission, Government of India has forcefully stated his view that in the field of computers, as in certain other areas of technology, we in this country should not be content with what is called 'intermediate technology' but try and adopt the most modern designs and practices that are available in the world. According to him, this is not for hand-waving or prestige but because it represents the best national investment.

3.13 **Prospects for Computer Development in India** : In the national scene, we are on the threshold of a five-year period which will see the establishment of a viable, national computer industry—based on the use of modern techniques. There will be 5 or 6 large computer-systems, imported from abroad, at the Regional Computer Centres to be established in different parts of the country—primarily to help our education, scientific and industrial research and information science programmes to gather momentum quickly and to correct the present imbalance in the pattern of computer utilization in the country. About a hundred medium-size computers will be indigenously produced in the country, for a variety of users, with emphasis on education, industrial process-controls and management. There is scope for a large number of small, special-purpose computers. It has been assessed that a considerable national capability exists in the design and manufacture of the hardware and soft-ware needed in this programme of development. The country is rather weak in peripheral equipment of the electro-mechanical type. A vigorous effort will be made to remove this deficiency and to produce special devices and sub-systems that are the building blocks of third-generation computers.

3.14 Some aspects of computer technology that are now well established in advanced countries—such as the hardware for large systems, time-sharing mode of operation, computer-aided instruction, on line management information systems and library automation—may not be within our reach in the foreseeable future. These cannot be realized overnight and we need to build up our basic infra-structure to be competent users of the potentialities of modern systems. But it is a characteristic of computers that

their power and that of the integrated information systems that they create are such that even developing countries, with their own priorities, national plans and goals can do the "leap-frogging" and share the fruits of the new technology.

3.15 **Conclusion** : In the memorable words of Dr. Vikram Sarabhai : "Our very backwardness and late arrival on the scene, together with the smallness of our past investment, may be turned into our most valuable advantages, if we make the right choices now and adjust ourselves to the demands of the current situation". Dr. Sarabhai was thinking of our Atomic Energy and Space Science Programmes. His remarks will apply equally well to our prospects and responsibilities in the area of Automation and Computer Technology.

ANNEXURE I

A. Landmarks in Computer Development

1950 : First Generation : First Computers (U.K. and U.S.A.) Assembly Language

1953—1958 : First Commercial Types. Introduction to Magnetic Tape.
Development of Magnetic Core. Memories.
Computers oriented to Data Processing.
High Speed Alpha-numeric (alphabetic and numeric) output

1958—1965 : Second Generation : Introduction of Operating Systems. First User Language (FORTRAN). Multiplicity of Languages (ALGOL, COBOL etc., Process Control (Machine Tools, Gasoline Cracking etc.)
Use of Transistors (increased reliability, less air-conditioning)
High hard-ware reliability. Large Disk Storage

1965 : Third Generation : Computer Systems (Hardware Operating Systems)
Use of Integrated Circuits (more reliability, decrease cost)
Multi-programming Systems. Remote Batch Job Entry
Time-Sharing Techniques. Interactive Graphics
Monolithic Circuits Optical Character Reading

1972 ? : Direct Execution of User Language

B. Characteristics of Computer Evolution

Characteristics	*Generations*			
	First	*Second*	*Third*	*Fourth*
	1950 58	1958—66	1966 —	1976 ?
1. Logic Technology	Vacuum Tube 5 MHZ Rs. 100/bit/sec	Transistors 50 MHZ Rs. 10/bit/sec	Integrated Circuit 500 MHZ Re. 1/bit/sec	MSI, ISI 10p/bit/sec.
2. Processor Concurrency	Interrupt	Look-ahead	Pipe-line	

3.	Processor Location	Central	Peripheral	Array	
4.	Memory Technology (Primary)	Core	Core	Core Film Solid State	Bubble Integrated
5.	Primary Memory	Small (4k)	Large (IMByte)	Large (8M Byte)	Associative
6.	Secondary Memory	Magnetic Tape	Moving Head Disc	Floating Head Disc	Photo-Store
7.	Mapping	Indirect Addressing	Protected pages	Shared Segments	
9.	Peripheral Orientation	Card	Tape	Several but limited concurrent operation	Enactment of Function
10.	Software	Machine Language Sub-routine Assemblers	High-level, Languages, Monitors, Macro-assemblers	Operating Systems, Multiprogramming, Data Management	Theoretical basis for programming in terms of interface functions and modules
11.	CPU : Peripheral Ratio	80 : 20	50 : 50	50 : 50	20 : 80
12.	Hardware : Soft-ware Ratio		50 : 50	67 : 33	
13.	Hardware Status (main consideration)	Reliability	Performance	Communication	Assignment
14.	Hardware/Software development	Independent	Independent	Somewhat dependent	Interrelated
15.	Disciplines	Materials Devices Circuits Logic System	Devices Circuits Logic Systems	Devices Logic Systems	Devices Systems
16.	Size	Medium Small	Large Medium	Large Medium Small Mini	Giant Mini
17.	Function	Scientific Computation	Scientific Commercial Computation	General purpose Computation	Experimental Communication and Control
18.	Compatibility	Individual	Family	Total Compatibility	Compatibility with user
19.	Major Improvement		Organization Performance	Economics of Computing	Organization (not technology) Efficiency (not performance)
20.	Guide for Growth	Serendipity	Serendipity	Serendipity	Snergetic (user needs)

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In the discussion of the paper at the Seminar on Thursday, March 30th in the Seminar room of the Institute under the Chairmanship of Dr. Alladi Ramakrishnan, Director, Institute of Mathematical Sciences, Madras, the definition of automation as distinct from automaticity, the choice offered by the computer which operates within the system of defined parameters and control variables, along with its varied use in different areas of intellectual and practical life were emphasized. The limitations to the use of computers were repeatedly stressed in various ways. The computer is not a substitute for

man. Computers must not control the human mind. There is the human use of the computer and the computer use of the computer. What we should ensure is the human use which depends on the information that we have and the balance that we maintain between the human mind and the computer results.

At this point the serious problem that data collection faces in the Country must be taken into account in thinking of the computer. Our primary data collection is in a backward state and requires an enormous increase of education and training of the people in order that the requisite data might be collected. We do not have reliable data to feed into the computer and the computer cannot assist in the collection of primary data. For such collection there may be imaginative and innovative ways of gathering primary data. There is no need to continue reliance at all times on classical survey and collection techniques.

Another problem which computer use faces in the country is with regard to its massive poverty. Given this human dimension and the over riding priority for our commitment to attack poverty in all its forms, the use and relevance of computers and their resource demands raise serious questions. In particular the prospects of "leap frogging" that computer use offers to developing countries like India were referred to with some scepticism. When there is no data and information base, when there is massive illiteracy, when there is a gigantic problem of carrying education to the increasing millions living in remote areas, when there is a heavy turning away, amounting to 60 percent of students, from schools before class V, the concept of "leap frogging" is difficult of application. There may be some telescoping of techniques that can be used in the situation but that is hardly "leap-frogging."

One view expressed rather pointedly was that given the climate against original thinking in the country, there is a real danger that the computer may strengthen this anti-intellectual movement. A student working on nuclear physics who has access to a computer has stopped thinking for himself, because he believes that the computer can do his thinking for him. In this view what the Country needs is ideas and more ideas and not computers. One idea could be worth crores of rupees. If computers are used, they should be used by men of commanding intellectual stature, men with ideas. What this country needs is a solid intellectual base and for this the whole current institutional structure which is against the development of ideas must be changed. We could buy computers from other countries but we should stop borrowing continously ideas from them all the time.

On the other hand, it was felt that we should start with accepting the revolutionary role of computers in modern society. We are today in the third stage of human civilization where information has become knowledge and knowledge energy. In the 19th century two raw materials were discovered, rubber and aluminium. In the 20th century plastics were born, not as a raw material but as part of matter. Similarly the use of the computer has turned craft into science and the workshop into technology. We are only at the beginning of the tremendous changes in human life and society that the computer is going to bring about. All our problems in India whether those of employment or education are massive and the computer can be used to understand and control the problems.

There is a particular use of the computer for our educational system in the country. That system now is forced to operate with a fixed time constraint at all levels as against varying aptitudes of the student masses and the objective of mastering a given area of knowledge. An institution like IIT which houses an entire school system from Nursery to High School as well as the Institute could experiment with its computer not only to follow the individual learning aptitude of each student but also help to vary the time period which each requires to attain mastery of the subject matter. In the Indian situation there are four immediate, productive and non-controversial uses of computers. They are information processing, storage and retrieval, production design, control and systems, education and scientific research and national and State development planning. All these are new areas where there will be no displacement of labour. One special aspect of information would be the recording and storage of our unique tradition of classical music.

Where do we start ? All are agreed that we start with education and training in the use of the computer. This not only refers to the development of our own software so that we cease simply borrowing it from abroad. We must realize that information and knowledge are not by themselves energy. It is the capacity to use information and knowledge that makes for energy transformation. It also means that basic science in the State and the Country must be upgraded. In other words software needs call for the training of managers as well as mathematicians, the training of computer engineers as well as human and social scientists. Computer use and the development of ideas can coexist as evidenced in IIT, Kanpur. There the use of the computer has been a challenge to the staff and students who have stated that some of the ideas and theories that have emanated from that Institution were the direct result of the challenge posed and the opportunity offered by the computer. It is this combination of high level general education and specialized computer use training along with a background that will promote original thought and a forest of ideas that will ensure the wise and effective use of computers in the most appropriate ways for the development of the people of the State and Country.

BOOKS FOR ALL

PART II

REALISATION OF THE BOOK PLAN*

The infrastructure for a programme of 'books for all'

The issues at stake with regard to books are set forth in my first lecture, and I now turn to a consideration of the infrastructure that should be developed or further developed during the seventies to ensure that the programme of Books for All to which we pledge ourselves this year becomes a reality.

The Production facet: The first element in the infrastructure is the responsibility of the production side of the book trade. We have here a sound base on which to build. We can enlarge our supply of books and improve their quality through expanding our printing capacity, improving our publishing skills developing our editorial and writing talent and increasing our working capital for publishing. Expanding our printing capacity requires much greater use of offset and rotary processes and some expansion of large capacity printing units where the size of the run demands it. It is commonplace that printing costs per given copy decrease in geometric ratio to the number of copies printed. For publishing concerned with school textbooks, literacy materials and some general works, large runs should be possible and these should use large capacity plants. I am assuming the return of textbook publishing in some form to the publishing industry and I will comment on this assumption later. In the case of smaller runs, in addition to offset, more use should be made of photo composition, so that small runs and low prices can co-exist.

The publishing techniques in the country are of an uneven nature. There are some firms which use successfully advanced techniques comparable to the best in other countries. A large number of our production units are however still in the handicraft stage. The capacity to plan and manage the creation production and ultimately distribution of books is no mystery. It can be learned by every publisher, whatever the scale of production and it is to the launching of such a learning programme that I would invite the particular attention of the Federation of Publishers and Book sellers during the seventies.

The development of editorial and writing skills is part of the responsibility of the book trade. The editorial needs of the publishing industry are increasing daily, and judging from the current quality and readability of the book in the country, this input is in somewhat short supply. As in the case of many other skills in our land, we have relied too long on the procedure of learning on the job, on the devoted and indefatiguable work of the amateur, on a kind of jack-of-all trades who acts as editor-cum-selector-cum-make ready technician-cum-proof-corrector-cum graphic artist. The time has now come for some breakdown in this impossibly composite and heterogeneous practice. The expanding book business and the prospects we are building for the seventies demand a

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* Extracts from the Second part of the Sital Primalani Memorial lectures and the inaugural Address of the 9th Sarada Renganathan lectures on the occasion of the International Book Year by Dr. Malcolm S. Adiseshiah.

specially trained carde of editors whose skills would considerably improve and heighten the readability and saleability of books. Educational and training programmes for editors could be developed in our growing schools of journalism, to be followed by an apprenticeship system which your Federation can work out.

As far as writing talent is concerned, this depends on the general educational atmosphere, scientific perspectives and technological progress of the country and the manner in which they act and react on creative writers. The task for the book trade in this area is a double one. The *first* is to evolve a system of identifying creative and readable writers. *Second* it must provide them with opportunities of growth and development. To some extent the market is a good barometer for gauging talent, provided its frictions are ironed out. In technical publishing, the publisher in Europe and North America relies on the advice and support of the professional organisations of specialists. In general publishing, he relies essentially on the market, on the saleability of the product, on its competing in some cases in the best seller category and issuing subsequently in some cases in the best seller category and later in paperbacks. For us in this country the book trade needs to develop closer contact with educational and scientific bodies in identifying writing talent. It should also help in organising workshops, seminars, training courses, conferences and confrontations in nurturing and developing these talents.

And then there is the capital requirements of the book trade. Here I should like to call the attention of planners, economists and financiers, the group which advises and orients the country on its economic growth, that the book trade has all the earmarks which entitle it to special attention and priority under current national policy. That policy places special emphasis on the neglected small producer, labour intensity and high employment potential and an extremely small gestation period. Our book trade is a production activity providing an immediately useable consumer goods, requiring only limited capital investment, involving a capital output ratio of 1.2 to 1.5, and is largely organised as small industry and enterprise. The capital requirements of a publishing firm are of two kinds: relatively long term capital for printing and binding equipment and short term capital to finance the publication of books. Long term capital can be raised by our large publishing companies through shares and equities both from the financial institutions which have become the main source of capital provision today as through the open market. Institutional long term finance of the capital needs of the small publisher must be fully and rapidly met in accordance with our current national priorities on credit. I would call the attention of our financial institutions to the capital needs and investment prospects of this sector of our development activity. As far as short term finance is concerned, our public sector banks with the cautiously recommended differential interest rates, should become an increasing source of finance of this nationally important but neglected sector. Shortage of working capital coupled with high interest rates in this industry acts as a vicious circle since it forces the publisher to limit the size of every edition to a number of copies that can be sold quickly and reduces his holding power for larger runs. This in turn increases production costs. raises prices and limits distribution even further. It also reduces the industry's employment potential. My suggestion is that financial institutions in meeting its capital requirement, should treat the publishing industry as a priority neglected sector. If this were done, then the financial target which I have suggested for the seventies of moving 0.1 per cent to 0.3 per cent of our Gross National Product for investment in the book industry can be attained and even surpassed.

The distribution facet: The second infrastructural imperative is the development and rapid strengthening of our distribution network, our libraries, bibliographical information services advertising and promotion programmes warehousing and transportation, wholesaling, book stores and any and every retail distribution outlet.

The library system of the country is the life stream of the book trade. It is the means of ensuring that the quantity of books produced for all reaches all readers, so that the programme of Books for All becomes a distribution as well as a production reality. Libraries everywhere constitute a decisive element of distribution. Eighty to 90 per cent of published children's books in Japan, United States, United Kingdom, France, Germany and the Soviet Union are purchased by their libraries, leaving only 10 to 20 per cent of the production to be sold through commercial channels.

Our library system, national and public, school, university and specialised, started with great audacity and vigour, presents today a mixed picture of success and stagnation, of some expansion alongside of a great deal of deterioration, Its reorganisation and revival must be regarded as a pre-requisite for the proper and adequate functioning of the book industry and the discharge of our obligation to provide Books for All during the seventies. On the whole the specialised university and national library systems are moving forward satisfactorily, functioning effectively and ensuring that the appropriate books and documents reach their audiences. The school and public library systems on the other hand present a relatively retarded and sorry picture and as these are the main instruments for ensuring that the produced books are available to all people, it is in this area that corrective action needs to be taken. It is not library planning nor library legislation that is lacking. All the planning and legislation needed have been effected. What is needed is integration of library programmes in on-going development programmes; particularly in the educational sector, some increase in financial resources and improved professionalised and decentralised administration.

Public and school library development, like education, is a State subject. Their situation varies from State to State and it is at the State level that remedial action needs to be quickly taken. Recently a four State Library spot-check at the State, district and village levels was undertaken in the South and the results provide a useful basis for action during the coming year. Only in one of the four States is the conclusion reached that the network of libraries (2840) run by the Government and private bodies, through Zilla Granthiya Samsthans, under the supervision of the State Department of public libraries is functioning satisfactorily. It provides 25 lakh books to 150 lakh readers. A Library cess is levied which with a matching grant from the State Government constitutes a well employed library fund. To provide order in the purchase and indent of books by the libraries, the Government is issuing two lists, a compulsory and an optional list from which book indents in the ratio of 25 : 75 can be made. In the second State, a department of public libraries has just been established. The system is developing good plans for the future. For now, there is the curious position of the Department not being able to expend the revenue collected from the library cess because of the very serious lack of accomodation and buildings for district and rural libraries. In the third State revised library legislation has been bogged down for over a decade due to pressures from private agencies which run 3700 private libraries. These libraries keep straying into extraneous fields such as eradication of untouchability, propagation of Hindi, running nursery schools, etc. In

the fourth State which was once the pioneer of the public library movement, the survey states that the library system is today a halting, rickety and ineffective service with its 1300 libraries unable to buy new books or expand their services, because 90 per cent of the library fund goes to meet the costs of administration. I have a feeling that this mixed picture is typical of the public library system in our country.

What is needed in each of our States is for the public library system to be placed under professional direction and management and to be given technical and operational freedom to place book indents and attract and expand membership and readership. The State and local authorities should double the library cess from the present average of 3 Paise to 6 Paise. The 3 Paise cess was set in the early 40's. The price index has since moved by over 700 points and the library cess needs to be moved by at least 100 points in order to make books available to all.

In the case of school libraries, the library grant which is practically non-existent must for each school be made a fixed proportion of its total pupil enrolment. There is also need for including in the pre- and in-service teacher training programmes of our institutions, training of school teachers who double as librarians, as well as all teachers, in better maintenance and utilisation of the school library.

The programme of Books for All also requires a parallel improvement in book distribution and sales throughout the country, particularly in our rural areas. Books should be sold not only in specialised book-shops, which is possible in urban areas though their current concentration in one or two urban localities are not customer oriented. Books should be on exhibition and sale in all places where people foregather, such as schools and colleges, libraries and museums, restaurants and cafes, cinema halls and grocery stalls, lobbies and hair-dressing saloons, hospitals and Government offices. Many a time as I have waited my turn at the Government office or a barbershop, I have looked around desperately for a book or a journal that I could lay my hands on. We have made a start with various programmes such as the home library plan to reach rural consumers. These need to be extended and popularised. The selling of books itself is an art and a profession and for book-sellers in our towns and cities there is need for continuous and accelerated training in improved selling methods, lay out designs of shops and books, and other techniques of retailing. I know the Federation is engaged in this programme and I raise the question whether an acceleration of its volume and rhythm should not be financed from a central fund to be built up by the Federation and charged to the working capital of its members. I believe the time is past when this important part of the programme should continue to rely on grants from outside the industry from Government, UNESCO, etc.

Wholeselling in book distribution in our country is not highly developed. The formation of central distribution centres with State and regional branches would be one means of promoting wholesale development. This is another initiative to which I call the attention of the Federation. The development of brisk, growing and progressive wholeselling and retailing of books in the country is also dependent on some attention being given to the problem of transport costs and postal rates. In a country with such vast distances as ours, where even our States cover large areas within their boundaries, the transport element has a major share in pushing up book costs. The potential rural and small town readership market can be developed only if this cost element is lowered and books are given the same concessional postal rates as registered newspapers.

The public: A *third* desiderata for the success of this programme of Books for All is a reading and book buying public. Here there are a few popular superstitions which need to be exploded and put out of the way. One is that the Indian public is devoted to books and that we Indians treat books as sacred, as sacred as the cow. The result is of course that our book trade and the book habit are as thin, mangy, and derelict as our cattle population. It is true that on one day in the year, Saraswathi Pooja, we clean the book and colour its pages with saffron. But that is all. For the other 364 days we do nothing to acquire books which are the object of such veneration. It is true that we never step on a book for that would be stepping on the goddess. It is equally true that it is always the other person's book that we are stepping on, either because we have none of our own or because the few that we have are locked away awaiting next year's pooja.

A second fallacy is that the country is too poor, the people too near the poverty line, to buy books. Of course we are poor. Unfortunately the majority of our people do live at the poverty line. But this situation does not prevent any, the rich and not so rich, and all of us, the poor and not so poor, spending large sums on marriages, births, deaths and other social occasions with their accompanying feasts, jewellery and apparel. Are books half, one-tenth as important as these ceremonies in which we, all of us, the poorest of us, indulge? Why is it that our poverty and lack of means are never brought up in matters of wasteful conspicuous consumption?

In the end the problem boils down not only to leading the horse to the river water but making sure that it has a thirst so that it does drink. It is not enough to plan and execute an expanded programme of book production. We need to promote the reading and book buying habit. This involves more than the promotion of literacy programmes and campaigns, though they are needed in their own right. We of the educated elite who are all of us so steeped in the oral tradition, if we could only spend one-tenth of the time that we spend talking and listening to each other, in reading and reflecting, the book demand of the country will multiply to a point where even the dimensions of the National Book Plan that I have sketched for the seventies will prove to be insufficient. And so what I am pleading for is that during the International Book Year we leave aside our pretentions, shibboleths and superstitions about the sacerdotal character of books, our alleged learning and learned traditions and our pretended respect for the wise man. In place we should frankly acknowledge our lacks and weaknesses in not acquiring books in the regular way we acquire clothes and food, in not reading reflecting and not encouraging and helping others to read and think. It is under such conditions that we can set for ourselves as the International Book Year resolution, that as a people we will each buy at least five books a year and use our libraries so that we will read around 20 books a year. In the end a reading and book acquiring public is the only sure basis of any programme of Books for All.

The Government: The Government in our country—the Central Government, the State Governments and the local authorities—have a decisive role in the effectuation of the programme of Books for All. I have already indicated the financial commitment for books resting on the Government at various levels—Central, State and local. No programme for book expansion and development for making books available to all our people can even get off the ground unless Government finances are made available in three directions. The *first* is that in the education budgets at all levels, Central State and local,

there must be clear, identifiable and increasing provision for the purchase of school text-books and literacy and post-literacy manuals so that all students and adults, whose number will be increasing in the seventies, have this basic instrumentality of education.

Does this mean that the Government itself should print and publish textbooks, or to use terms familiar to us, should we nationalise textbooks? The pros and cons of this policy has been amply debated in the various States and it has become general policy in the States. The policy has aimed at raising the quality of books, increasing their supply, lowering their price and appropriating for the State the profits from the enterprise. On the other hand the policy has become the most serious constraint on the book industry, despite the commendable efforts of the industry to diversify its production. My own conclusion is that the policy has not resulted in raising the quality of books nor in increasing their supply and access. It has introduced an element of curricular rigidity at a time when there should be more educational flexibility and innovation. Now that passions on the question have cooled on both sides, I suggest that each State Government review its policy of textbook publishing from the point of view of optimum quality, supply, access and low costs. If this were done, a new policy will follow involving the concentration of State Government publishing on adult literacy manuals and textbooks for the first four years of primary school which are compulsory, and leaving the publishing of other school and university books to the industry under the norms and approval procedures of the appropriate departments of State Governments and universities.

The *second* obligation is that the Government must facilitate and finance an increased supply and adequate grades of book paper to the industry. From UNESCO I have been personally responsible during the sixties for negotiating with the four Scandinavian countries. Australia and New Zealand for the supply of large quantities of paper for our textbooks. I have also made available from UNESCO the kind of special paper that the children's encyclopaedia requires. The target of 144 pages per person per year will involve a four fold increase in the demand for paper from the present 8 lakh tonnes to 35 lakh tonnes. Its implications for the output of the paper industry also involve some upgrading and diversification in the quality of paper now produced. But the paper supply prospects are sombre. Only recently at the first meeting of the Development Council of Pulp Paper and Allied Industries, the Minister of Industrial Development has warned us of a great paper famine which is around the corner. He pointed out that this paper famine could be as disastrous as our recent food famine. In two years we will need 16 lakh tonnes and our installed capacity is only 12 lakh tonnes. I would like to associate myself with the appeal made by the Minister for urgent measures to increase the supply of paper. But my appeal is to him: The Government's crash programme committee has recommended twenty-two expansion schemes of which only fifteen have been approved because of the Monopolies Act. In addition seven licences have been issued. Production will thus increase by two lakh tonnes, leaving a supply shortfall of two lakh tonnes in two years from now. The Government should permit further capacity expansions of existing plants and licence new plants immediately so that the mounting demand for paper which will double again between 1973 and 1980 is met and the spiraling of paper prices arrested. Further liberal importing of capital goods for expansion of existing plants and for setting up new plants is needed. Probably even more serious for the book programme than the short supply in paper stocks is the continuing rise in paper prices. Here our worst fore-bodings are beginning to materialise. Paper prices have jumped from Rs. 100/- to

Rs. 1,000/- per tonne. The damping of this price rise will not be achieved simply through statutory price controls and the price stamping schemes that are being planned, but also and essentially through enhanced production and supply.

The *third* Governmental intervention is in the more generous and adequate provision of the foreign exchange needed by the book trade and by the book consumers. Certain types of papers, certain machinery will have to be imported. Some scientific and technological books and sophisticated audio visual media which support the book programme will also have to be imported. A regular and speedy allocation of foreign exchange is thus an essential part of an expanding book programme.

The other support of the Government which is probably more basic is extra financial. It is the active encouragement of the expansion of the book industry and the free-reading of all books, without let or hindrance. In this catalytic and promotional role of Government with regard to books, there is a historical back-log to be reckoned with. My mind in this context goes back to the stalwarts of book publishing and reading. Milton, Voltaire, Rousseau, Benjamin Franklin, Dadabhai Naoroji and others. In his celebrated plea, John Milton in Areopagitica, A Speech for the Liberty of Unlicensed Printing declared : Truth and understanding are not such wares as to be monopolised and traded in by tickets, and statutes, and standards. We must not think to make a staple commodity of all the knowledge in the land, to mark and license it like our broadcloth and our woolpacks. The licensing of books has been practised in our country till recently and we need only recall in this connection the memorable defences of free publishing by our follow countrymen in the 19th and 20th centuries. Licences, taxes on knowledge and the power of riches still follow us and act as restraints on our freedom to publish and, what is worse, the freedom to read. I am reminded of the tragic words of the French writer Lamennais: one must have money, much money, to enjoy, to write, to speak. We are not rich and so must be silent. I discovered only recently, returning home as I have done after an absence of twenty-five years which is the time span of our independent existence that to launch an academic journal, my printer, publisher, and I had to conform to antiquated publishing and printing laws, going back to the 1860, involving a serious waste of time, energy, money and intellect on the part of everyone, the two Government offices in Delhi and Madras, the judiciary in Madras and the time and energy of all my partners. The paper we had to fill in quadruplicate, and the quite outdated swearing in demanded of us, not only at the time of the initial publication but every time some change is made to improve efficiency are ludicrous but even more tragic in relation to the fundamental rights to which we are all entitled as citizens of this land. Our legislation needs to be reviewed thoroughly and comprehensively in order to remove all restraints, voluntary and involuntary, historical and anti-diluvian, in order to make the programme of Books for All, a legislative national reality in the seventies.

The international dimension : The Indian programme of Books for All which we are called upon to initiate as our contribution to the International Book Year requires also an international infrastructure. The first element in this infrastructure is to lower the international barriers to the trade in books. The UNESCO agreement on the importation of educational, scientific and cultural material, the UNESCO International Coupon Scheme and the simplification of the cumbersome and complicated import procedures and restrictions relating to the trade in books demand our full support for two reasons. Through

them we can meet our need to import the scientific and technological books that our national development demands. An even more compelling reason is that we should support the extension and the application of the right to books in all countries and the free trading in books as a corollary of this right and a moral imperative. In this connection we should welcome the initative of UNESCO in negotiating with the United Nations Conference on Trade and Development solutions to the problem of shortages of currency for the purchase of books and we should give these negotiations our Government's support.

International financial co-operation is an imperative in the field. In the development of paper plants, and the printing industry particularly those requiring large and modern plants, in order to meet the heavy run for school books and literacy and post literacy primers and manuals, the credit facilities of the soft loan component of the International Bank for Reconstruction and Development, the International Development Association, should be used. The capital resources required for educational publishing enter into the priority criteria of this institution.

Another area where international action is called for is in reducing the cost of transport of books, both the transport costs of our import and those of our budding but expandable export trade in books. Books are heavy and give rise to a special transport problem. This problem is further aggravated because speed in the transport of books is essential in order to avoid their becoming out of date. Hence more and more resort is being had to the air transport of books. But the book price which has a limited overhead margin and which must also cover rather heavy distribution and promotion costs in this country, cannot afford the escalating costs of air transport being added on to it. UNESCO should therefore be urged to continue to negotiate not only with the Universal Postal Union for a reduction in postal rates : it must also, with the support of the United Nations Economic and Socal Council, negotiate with the shipping and air companies, the Governments of Europe, North America and Japan, the World Maritime Organisation and the International Air Transport Association for a reduction in and preferential treatment of shipping and air freights for books.

Finally in accordance with my earlier references, UNESCO's Clearing House Service on copyrights can help India's book Programme by negotiating for facilities and in some cases for full exemption with regard to copyrights of books, particularly children's scientific and technical books. It can collect information on the books that we need, negotiate the most favourable terms on them, and arrange for the transfer of rights ceded by copyright holders. It can generally act as a useful and effective liaison between our national copyright service and those of other countries.

The vistas for the seventies

Such are the vistas which the International Book Year opens to us. They are vistas which extend to every person in the country, and to every family in the land. Their horizons of imparting knowledge and skill, promoting well being and understanding, and spreading peace and friendship both immediately beckoning and endlessly receding. Facing as we do a serious internal crisis imposed on us by our poverty, surrounded as we

are by pressures including the continued tenisions in our continent we have yet to heed and follow the call of International Book Year, to build slowly, surely and relentlessly this programme on which the intellectual and spiritual well-being of our people and our world depend. In so responding to the call of 1972. we can turn to and follow in the wise words which were forged in yet another crisis laden battle field :

The business is with the action only, never with its fruits ;
Better one's own duty, though destitute of merit,
Than the duty of another well discharged.

May we each harken to the call of the International Book Year and make action in response to it our business. May such action be dutifully discharged which is its own merit.

CORRESPONDENCE

Extracts from letter dated 15-3-72 from Prof: T. Surya Narayana Rao, of Osmania University, Hyderabad.

Dear Dr. Adiseshiah,

The Osmania Research Group met here on March 12, at the residence of Sri K. Seshagiri Rao at Shiv Rampally, a few miles from Hyderabad. It was a family get-together too as the group wanted to foster more informal and intimate relationship among the members. The place is an Ashram run on Gandhian lines under the immediate presence of Sri Prabhakarji, the Sarvodaya Leader. The following people were present :

1. Dr. Smt. Yadav Reddy
2. Dr. M. Nagaraja Rao
3. Smt. and Shri H. Venkateswar Rao
4. Sri. M. Narasimhulu
5. Smt. and Sri Nandedkar
6. Sri. K. Seshagiri Rao
7. Smt. and Sri. T. Suryanarayara Rao.

Sri Prabhakarji the Ashram Chief spent about an hour with us discussing about the need to conduct research into Gandhian Economic thought and its relevance to modern conditions. He stressed that the researchers should develop an attitude to life without just confining themselves to intellectual exercises.

The group then met separately for two hours to hear Dr. Yadav Reddy, Reader in Economics, Osmania University on "Some thoughts on Research" and to discuss them with reference to their individual problems. Dr. M. Nagaraja Rao presided, Dr. Yadav Reddy said that to choose a correct topic is to win half the battle in research matters. It should be a topic which can lend itself to research studies and more ambition and emotional approach would not help. The second job is to acquire research tools to be able to test a hypothesis if any, to collect data, to "read" the data already available, and a general framework of theory. The third and most arduous task is to put the findings into a readable setting. Whether inductive or deductive, the analysis has to throw up something that has value in itself.

In recent years collective research has become more popular. It depended upon the subject, the date and the actual needs of the agency in change.

Dr. Yadava Reddy thought informal discussions among researchers was most valuable, though formal seminars were also contributory factors. The researcher would save a lot of time and energy if proper planning is made in advance leaving enough flexibility in actual operation.

Dr. Nagaraja Rao in his remarks explained how in certain cases data could give trouble, either because of inadequacy or non reliability. The researcher should be capable of seeing through the data and get at the trends. He should also be able to "connect the threads". This is the art of research work. Here the researcher should show theoretical back ground and clarity in expression which would prove inestimable aids.

Discussion centred round the following issues :

(a) Choice of tools, both statistical and theoretical
(b) Policy orientation as different from degree prospects
(c) Role of the guide
(d) Ways & means to minimise time to complete a research project while maximising the value.

(Sd.) T. SURYANARAYARA RAO.

Regd. No. M. 8831

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